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Republic of Korea
Appraisal of
Second Integrated Dairy Development Project

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CURRENCY EQUIVALENTS

US$1	=	485 won
Won 100	=	US$0.206
Won 1,000,000	=	US$2,062

WEIGHTS AND MEASURES
(Metric System)

1 kilogram (kg)	=	2.202 pounds (lb)
1 metric ton (mt)	=	2,200 pounds (lb)
1 millimeter (mm)	=	0.039 inches (in)
1 meter (m)	=	39.37 inches (in)
1 kilometer (km)	=	0.621 mile (mi)
1 hectare (ha)	=	2.475 acres (ac)
1 square kilometer (sq km)	=	0.396 square miles (sq mi)
1 cubic meter (cu m)	=	35.71 cubic feet (cu ft)
1 liter (l)	=	0.219 gallons (British)
1 liter (l)	=	0.264 gallons (US)

GLOSSARY AND ABBREVIATIONS

AI	-	Artificial Insemination
AU	-	Animal Unit
AFDC	-	Agriculture and Fishery Development Corporation
EPB	-	Economic Planning Board
KDBC	-	Korea Dairy Beef Company
KVA	-	Kilovolt Amperes
MAF	-	Ministry of Agriculture and Fisheries
NACF	-	National Agriculture Cooperative Federation
ORD	-	Office of Rural Development
RME	-	Raw Milk Equivalent

REPUBLIC OF KOREA

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No. IBRD-11660

KOREA

THE SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

SUMMARY AND CONCLUSIONS

i. Agriculture plays a major role in the economy of Korea. This sector employs about half of the total labor force, accounts for nearly 23% of GNP and provides raw materials and markets for a large share of Korea's dynamic industrial sector. However, agriculture's importance in the economy as measured by its share of employment, GNP and total exports has declined in the last decade and agricultural production has not kept pace with growing market requirements. Income gains of the rural population have improved considerably in recent years and are near parity with the urban population.

ii. Government is placing increasing priority on agricultural development and is preparing and implementing programs and projects to assist the farmers in taking advantage of opportunities to diversify their production and utilize their labor more fully. Fundamental to this development is the consolidation of agricultural resources into viable production units which are capable of maintaining or improving the relative income position of farmers in the industrialized economy. Livestock farming has considerable potential for achieving these goals.

iii. The proposed project would be the Bank Group's seventh in agriculture in Korea (totaling US$130.5 million) and the second loan for livestock development. The Project would continue Bank Group support of the livestock sector commenced under the Integrated Dairy/Beef Development Project (Credit 234-KO) of US$7 million on which disbursements will be completed in November 1975. The Project would provide for on-farm development of 4,600 ha of unutilized land and 2,000 ha of partially developed land. 450 new family-sized dairy farms based initially on the production of 8 imported heifers would be established, and about 400 existing farms presently with an average of 5 heifers would be expanded to assure their long term viability. The milk processing facilities constructed under the first project would be expanded to increase the production of baby milk powder, sterilized fluid milk and whole milk powder, and would be diversified to include the production of butterfat, evaporated milk and powdered coffee creamer. A frozen milk products plant would be constructed at Yeongnam and two milk collection centers opened, one near Jinui and the other at Honam. Technical services currently available for development of both farm and milk processing facilities would be continued with greater emphasis on training of Korean staff.

iv. The Korea Dairy Beef Company (KDBC) which was the executing agency for the first livestock project, would be the executing agency for the proposed second project. Under the guidance of the Ministry of Agriculture and Fisheries, it would be responsible for (a) planning, disbursement and supervision of farm development loans; (b) planning, financing, construction and operation of milk processing facilities; (c) product marketing, and (d) local training of KDBC staff and participating farmers.

v. Total project cost, including working capital and contingencies in the disbursement phase, is estimated at US$24.5 million. About US$13.9 million would be used for dairy farm development, US$8.8 million for the construction of dairy processing facilities, US$1.8 million for management and technical services. The proposed IBRD loan of US$15.0 million would finance all foreign exchange costs of the proposed project. The Government contribution would be US$3.9 million. Farmers would contribute a total of US$2.6 million to the Project, i.e. about 27% of total dairy development costs excluding contingencies. KDBC would provide US$3.0 million raised through share capital of which 70% would finance the local cost component of investments in dairy processing, 20% for the local costs of plant working capital and 10% for costs incurred in management and technical services to farmers, and for milk processing. Government would on-lend the IBRD loan to KDBC at 8.5% for 15 years, including 6 years grace. Government would assume the foreign exchange risk for IBRD funds for farm development and technical services while KDBC would assume the foreign exchange risk on the processing facilities. Additional funds would be provided by Government through the National Agriculture Cooperative Federation (NACF) to KDBC at 9.0% for 9 years with 4 years grace. KDBC would on-lend pasture establishment funds to farmers at 9%, for 9 years, including 3 years grace, and all other funds for dairy farm development at 12% for 9 years, including 3 years grace.

vi. International competitive bidding, in accordance with IBRD Guidelines, would be used for the purchase of dairy processing and other equipment (US$3.9 million). Price quotations would be obtained from at least three countries for importation of dairy heifers (US$4.48 million) as is usual in other Bank livestock projects (para 3.16). Other items would be procured through competitive bidding locally advertised or through existing commercial channels.

vii. At full development the project would directly benefit 850 farm households and would raise net farm incomes about 350%. The Project would produce about 22,600 mt of raw milk per year which would add to the national production of processed milk products by about 5500 mt of sterilized milk, 1800 mt of baby milk powder, 460 mt of powdered coffee creamer and 11,000 mt of frozen milk products. In addition, national beef production would be increased by 900 mt of beef per year. New on-farm jobs would be created for 800-1000 permanent workers and about 3,500 casual workers. The estimated financial rate of return to the farmers investment would range from 20-28%. The economic rate of return for the proposed project is estimated to be 15%.

viii. The Project would assist the Government in its effort to expand livestock production, raise rural incomes, and substitute imported feed concentrates with grass and fodder crops. It would enable farmers to diversify their production, utilize their labor more fully, and bring previously unused upland into production. In addition, the extension and research activities in pasture development, dairy husbandry and milk production and processing, would encourage improvement in the efficiency of dairy production not only in the project areas, but throughout Korea.

ix. The Project is suitable for a Bank loan of US$15.0 million equivalent to the Republic of Korea for a 25 year term, including seven years of grace.

REPUBLIC OF KOREA

SECOND INTEGRATED DAIRY-BEEF DEVELOPMENT PROJECT

I. INTRODUCTION

1.01 The Government of the Republic of Korea has requested Bank Group funds to assist the development of its livestock industry. The project was appraised by a mission comprised of Messrs. G. Fox, P. Melkye, Ms. R. Torreira (IBRD) and Messrs. F. Knobel and D. King (Consultants) in July/August, 1974. A post appraisal mission comprised of Messrs. Fox, Melkye and Downing returned to Korea in December 1974 to review with the Government of Korea and the Korea Dairy Beef Company the findings of the appraisal mission and explore ways of improving the efficiency of the proposed development. While the mission was in Korea, Government announced a 20% devaluation of the won. This necessitated considerable reworking of the data and modification of the Project in order to take into account changes in the Government's price and subsidy policy towards the livestock sector. These aspects of the Project had to be reviewed further in Korea in April 1975, by Messrs. Fox and Melkye.

II. BACKGROUND

A. General

2.01 The Republic of Korea covers an area of about 98,000 km^2 and has a population of about 34 million. During 1963-72, real GNP rose at an average annual rate of nearly 10%. The rapid increase of national output, together with a decline in the population growth rate from 2.3% in 1965 to 1.7% in the early 1970's made possible the doubling of real per capita GNP to $310 by 1972. The driving force behind Korea's growth has been the expansion of the industrial sector which in 1972 contributed 26% of GNP surpassing that of agriculture for the first time.

2.02 While lagging behind the rest of the economy, agricultural production nonetheless expanded by a creditable 3.5% per annum during 1967-72 and in 1974 accounted for 25.5% of GNP. Livestock production increased 4.4% during 1962-72 and in 1974 rose 7.5% mainly due to larger inputs of feed grains. During the next few years, livestock production is expected to increase about 5% per annum.

2.03 Korea has achieved significant increases in exports of agricultural and fishery products. Foreign exchange earnings from these sources increased from US$178 million in 1971 to US$423 million in 1974. Most of this increase has come from increased exports of silk and fishery products. Increased foreign exchange earnings from these sources, however, have not

kept pace with growing imports of grains and livestock products. Consequently, Korea's trade deficit in the agricultural sector (including fisheries) increased from US$115 million in 1971 to US$333 million in 1974 and is likely to total about US$360 million in 1975 due to larger grain imports.

2.04 The Government places higher priority on agricultural development in its investment program for 1975 than it did in 1974. Total investment outlays from all sources for agriculture (including forestry and fisheries) are expected to rise from US$354 million in 1974 to US$544 million in 1975, two-thirds of the increase being used to support rural development projects under the Sae Maeul Movement (Annex 1, para 6). Agriculture's share of total investment outlays would rise from 8% in 1974 to 10.9% in 1975. The Government budget for agriculture is expected to increase from 16.9% in 1974 to 20% in 1975. Agriculture's share of foreign capital in the Government budget would rise from 7% in 1974 to 14% in 1975. These budgetary increases, however, will be barely sufficient to keep pace with rising prices.

2.05 The Government's development strategy for agriculture is based on export expansion and import substitution programs. High priority is given to expansion of foodgrain production to achieve self-sufficiency; improvement of the relative income position of farmers to urban workers; diversification of on-farm production and more efficient usage of farm labor. Growth in livestock production offers Government a means of attaining their goals and is an integral part of the strategy of achieving the structural changes in the rural economy being pursued through the Sae Maeul Movement.

B. The Agricultural Sector

General

2.06 Of the 10 million hectares in Korea, 70% is idle woodland sparsely covered with trees. Of the remaining 3.0 million ha, there are 2.3 million ha of cultivated land, 60% is irrigated and the rest dry upland. Farm households total 2.5 million with an average land size of 1 ha. In 1973, 36% of Korea farm housholds had less than 0.5 ha of cropland and comprised about half the population in the lowest 40% income category. The other half are low-income families in urban areas. Since the 1950's land reform almost all the 2.3 million ha of cultivated land is owner operated.

2.07 Rural household incomes increased greatly in 1973 and 1974 following larger farm output and a concerted Government effort to raise the price of farm products and at the same time subsidize the cost of inputs (notably fertilizers). Rural household incomes at the end of 1974 were near parity with urban household incomes. However, as rural households are larger and have more workers per household than do urban households, per worker incomes average about 50% lower than in urban areas. In spite of a long-term downward trend in farm employment, agriculture still employs about half the total work force.

Cattle Production

2.08 Of the cattle population of 1.8 million, all are native Korean cattle except for 8,000 head of specialized beef breeds and 65,000 dairy cattle. In 1972, the average herd size per owner family for mature cattle was 1.2 head, and dairy cattle 9.2 head. Over 1 million of Korea's 2.5 million farm families keep cattle for draft power, and cattle for specialized beef production, are raised on a little over 1% of all farm households.

2.09 Beef production was estimated at about 46,000 mt in 1973. Domestic production of milk increased from 4,512 mt in 1963 to 104,082 mt in 1973, yearly consumption per capita increasing from 1.3 kg to about 4 kg 1/. There have been no commercial imports of milk products since 1965 and gift imports ceased in 1972.

2.10 There are substantial untapped land resources that could be profitably developed for cattle production. Estimates for establishment of improved pastures, based on suitable soil quality and ground slope, range from 350,000 to 800,000 ha. In addition the Ministry of Agriculture and Fisheries (MAF) considers that there are about 700,000 ha of lowland irrigated paddy fields which could be double-cropped for hay, silage or green feed. These areas represent more than the industry could be expected to use in the next 15 or so years even with ambitious livestock production expansion programs. A review of agriculture and the livestock industry in Korea is provided in Annex 1.

Animal Health

2.11 Animal health hazards are not a serious impediment to livestock production. The two main production hazards are infertility and mastitis. 2/ Available evidence suggests that infertility is the result of deficiencies in the artificial insemination service and inadequate nutrition. Farmers will require ongoing technical assistance to control mastitis. Strict quarantine and import regulations ensure that major diseases are not introduced during importation.

1/ As compared with per capita consumption of milk and milk products of 0.5 kg per annum in Indonesia, 17.4 kg per annum in the Philippines and over 50 kg in Japan.

2/ An infection of the milk glands that may cause serious loss in production and quality of milk. The infection may be controlled by observing strict milking hygiene and through the use of antibiotics.

C. Agricultural Services

Research, Extension and Education

2.12 Agricultural research and extension services are provided principally by the MAF through the Office of Rural Development (ORD) and the National Agricultural Cooperative Federation (NACF). Services are numerous and there are adequate facilities; however, the quality of livestock research and extension needs considerable improvement. A priority task would be to provide the farmer with simple input-output data on the production and yields of grain and forage crops, on fertilizer and concentrate use, and to work out the management and husbandry systems best suited to the Korean environment. Current programs are deficient in meeting these needs but would be improved by provision of technical services in the proposed project.

2.13 There are more than 180 agricultural high schools and 16 agricultural colleges, 13 of which offer training in livestock production, management and processing and in veterinary medicine. Short courses are available to farmers through the extension service. The Korea-New Zealand Demonstration Dairy Farm at Pyongtaek, administered by the Korea Dairy Beef Company (KDBC), provides practical training in dairy production and management.

Agricultural Credit Institutions

2.14 The banking system has two main components: commercial banks and special financing institutions. Commercial banks make no loans to farmers while only a minimal amount of credit goes to agro-industry and commodity dealers.

2.15 There are seven special financial institutions, one of which, the National Agricultural Cooperatives Federation (NACF), functions as an instrument for national policies in agriculture and is hence intimately associated with the Government in its operations. NACF is both a bank, receiving deposits and making loans, and a general cooperative institution that engages in a wide range of other activities, including marketing, purchase and supply, mutual insurance and management guidance. Its credit operations, some subsidized, are the largest individual item, followed by supply and marketing activities. NACF would participate in the project by providing loans to KDBC out of its own resources, with interest payments subsidized by the Government; it would not have responsibility for administrative or technical aspects of the project. NACF is the executing agency of the (first) Agricultural Credit Project (Credit 335-KO) and is also participating in the Integrated Agricultural Products Processing Project (Loan 994-KO) as a conduit for loans to farmers. A loan for a second agricultural credit project to be administered by NACF is to be appraised shortly.

2.16 AFDC: The Agriculture and Fishery Development Corporation (AFDC), a Government invested agency under MAF was established by special legislation

in 1967 to foster agro-industry development in Korea through financing equity investment and providing long, medium and short-term loans; encouraging domestic and foreign investments; providing technical and managerial assistance and training to borrowers, and developing domestic and export markets. It has a qualified staff to provide management and technical guidance to its affiliated companies. ADFC's investment policy is to sell its shares in an enterprise as soon as the project becomes viable and capable of independent management. AFDC is the borrower and executing agency for the Integrated Agricultural Products Processing Project (994-KO).

2.17 KDBC: KDBC was established by AFDC in February 1969 as one of its 22 diversified agro-industry investment projects. The objective of this enterprise parallels the national policy of fostering investments in the livestock industry to increase the protein food supply while also providing the rural people with wider opportunities to increase their cash income. In February 1971, KDBC became the executing agency for IDA Credit 234-KO of US$7.0 million to implement the Integrated Dairy/Beef Development Project for the establishment of small and medium-sized dairy farms by providing long-term loans, the construction and operation of 2 dairy products processing plants and the provision of management and technical services related to these activities (see Annex 3).

D. Dairy Products Sub-Sector

2.18 Milk processing operations for pasteurized bottled milk began in Korea in 1962, for condensed milk in 1963, and powdered milk in 1965. Prior to 1965, Korea imported not less than 90% of all its milk product needs and received 96% of these milk imports as grants. In 1965 Government banned commercial imports and in 1972 all gifts imports were suspended. The embargo on the importation of virtually all milk products is part of a Government program to strengthen the dairy processing sub-sector and raise rural incomes of those farmers owning unproductive land. A detailed description of the Korean dairy products sub-sector is contained in Annex 2.

2.19 Government policy in the processing sub-sector is to encourage all cooperatives, and private and semi-private companies to satisfy the national demand for dairy products. There are 35 small cooperatives, 4 large cooperatives, 5 large commercial plants, and 4 small commercial plants. The total installed processing capacity in Korea is about 179,000 mt per year and total production is about 175,000 mt. By 1985 total production to meet demand projections and utilize raw milk supplies is likely to be about 859,000 mt. A rapid expansion in investment in dairy processing is required to meet this level of production unless Government is to recommence importation of dairy products. It is expected that the production of fluid milk will absorb 50% of available raw milk supplies in 1981, baby milk powder

about 19%, frozen milk products about 10%, milk powders about 19% and 2% will be used in the manufacture of coffee creamers, yoghurts, cheese, etc. Dairy processing will require substantial expansion of milk drying facilities to provide for increases in demand for baby milk powder and other powders used to provide milk solids to food processing industries. A steady expansion of fluid milk plants is required, but by far the largest gap to be filled in milk processing will be the provision of frozen milk products. The outstanding need for the period 1976 into the 1980's will be for more facilities in the the Yeongnam-Busan area which has a population of 4 million and has been undersupplied in milk and milk products. National plans for provision of these facilities rely heavily on the projected phase II expansion of KDBC.

III. THE PROJECT

A. KDBC's Dairy Development Program

The Ongoing Program

3.01 KDBC's ongoing program was financed by IDA Credit 234-KO which became effective in August 1971 with KDBC as the executing agency (para 2.17). Its objective is to increase the national milk supply through a credit program for dairy development on unutilized upland. The Project included the establishment of small dairy farms, erection of two processing facilities, and the provision of adequate technical services for farmers. Stimulus for the KDBC program arose from the rapid increase in the cost of imported feeds and the difficulty of obtaining reliable overseas supplies. This meant that if Korea was to have an adequate foundation for its dairy industry it would need to reduce its reliance on imported stockfeeds and substitute these with locally grown pasture and forage crops.

3.02 To date about 580 farmers have participated in the Project and farm loans of about US$4.5 million equivalent have been approved. About 4,900 cattle have been purchased and two dairy plants have been constructed and are in operation. Problems with pasture establishment, artificial insemination and calf rearing together with the rising cost of all farm inputs have decreased forecast benefits on farms. Also, while during project preparation and appraisal it had been envisaged that project farms would be stocked with imported heifer calves, project implementation showed that participating farmers had a strong preference for the importation of older, pregnant heifers. The farmers argued that having made the investment in pasture and on-farm dairy facilities it was essential for them to obtain cattle close to lactation in order to generate an earlier cash income and protect their financial position. The Project accommodated this preference, but, the increased costs of importing older pregnant heifers meant that about 70% of project farmers

were allocated only five cows per farm instead of the minimum placement of seven envisaged at appraisal. Since the great majority of these farmers had made investments in buildings, plant and machinery, and to a lesser extent, in pasture establishment to accommodate the anticipated minimum seven cows, their cost overheads per cow were greater than anticipated and their farm incomes were considerably reduced on what had been anticipated at the time of project appraisal. In recognition of this situation, Government has agreed to increase the size of the dairy farms to be established under Project II to comprise an initial unit of eight milking cows with a minimum of eight hectares of grazing land. Smaller dairy farms established under Project I would be eligible for expansion under Project II (para 3.08).

3.03 Delays in the construction of the processing facilities and earlier than planned start of milk flow from farms due to the importation of pregnant heifers forced KDBC temporarily to assume the collection costs of the raw milk, sell it to other processors at no profit and at times pay farmers a price less than that paid by other milk processing companies. Since mid 1974 processing plants financed under the Project have been in full operation and have allowed KDBC to assume its role as marketing and processing agency as envisioned under the Project. It is not possible at this stage to estimate long-term debts since the first installments on long-term loans did not fall due to any appreciable extent until June 1975. Technical services for the processing component of the Project have been excellent and satisfactory for on-farm development. Loan funds, except for dairy processing, had been fully committed at July 1975.

Project Formulation

3.04 The experience gained in Project I by Government, KDBC and farmers provided the basis for the selection of a package of activities and investments for inclusion in Project II. The Project has demonstrated that dairy farms can be established on idle land hitherto unrecognized by most Koreans as being suitable for dairying. It contributed important data about costs of milk production utilizing pasture and fodder crops under Korean conditions, and has pointed the way to further efficiencies in dairy farm operations in Korea, particularly the reduction in the amount of concentrates needed to sustain production. The consumption of imported feed concentrates on Project I farms is estimated to have declined 50% over comparable dairy units based on the traditional non-pasture system of production, which is dependent upon large inputs of concentrates and purchased hay and rice straw. The production system on Project I farms once they are fully developed and stocked should ensure higher net incomes than those from traditional non-pasture units.

3.05 Based on the results of Project I, two types of farms would be developed, new dairy farms and farms in Project I requiring assistance to reach a viable scale of operation. The investments for new farm development would provide for the establishment of eight ha of pasture/forage crops, essential farm buildings and machinery, and eight imported pregnant heifers

per farm. Project I farms with less than eight cows which have a minimum of seven ha of potential pasture/forage land would receive additional imported pregnant heifers to raise the cow herd to eight and sufficient finance to improve the carrying capacity of the farm to accommodate the additional heifers.

3.06 As under Project I the sites selected for new dairy development would be in areas of unused, low rolling to hilly land. Soils are poor, shallow and support low scrub interpersed with small trees. Farms are privately owned and average 9 ha comprised of 7.5 ha of unused rough upland and about 1.5 ha of irrigated and non-irrigated lowland. Farm incomes average 640,000 won, this being obtained from cropping on the lowlands and from off-farm employment.

B. Project Objectives

3.07 The Project has been designed to meet the Government objectives for accelerated growth of the dairy industry. It would continue growth in the subsector supported by the Credit for Project I and by utilizing improved technology would lead to greater efficiency in dairy production in Korea. Specifically the Project would enhance Government efforts to raise rural incomes and to develop mixed farming. The Project would assist Korean agriculture to meet the rapidly growing demand for milk and meat products and it would enable farmers to diversify production and utilize their labor more fully. The provision of a package of services to farmers through an integrated program of farmer training and technical services, farm development, coordinated development of milk processing facilities, and improvement in marketing and sales will assure the farmer of access to up-to-date pasture technology, a market for his milk supply and a more reliable source of income.

C. Project Description

3.08 The Second Integrated Dairy Development Project would finance the following activities:

(a) development of about 450 new family-size dairy farms based on an initial unit of 8 heifers (US$11.2 million including contingencies);

(b) further development of about 400 dairy farms in Project I (Credit 234-KO) to assure their viability in the long-term (see para 3.02 and Annex 3) (US$2.7 million including contingencies);

(c) (i) the expansion of existing processing plants which produce baby milk-powder, sterilized fluid milk, and wholemilk powders; (ii) the diversification of present plants to include production of butterfat, evaporated milk, and powdered coffee creamer; (iii) the establishment of one milk collection center in the Central region and one in the Honam region; (iv) the provision of approximately 50 small milk cooling units; and, (v) the construction of a frozen milk products plant at Yeongnam (US$8.8 million including contingencies);

(d) expansion of technical services for development of both farm and milk processing facilities (US$1.8 million including contingencies).

D. The Project Areas

3.09 Project I developed two regions - Central and Honam (Map I). The Central region is roughly 50-150 km south of Seoul and is served by the Korea Dairy Beef Company's (KDBC) Central milk processing plant at Jinui. The Honam region is 300-400 km south of Seoul and is served by the second of KDBC's milk processing plants at Gwangju. In Project I the Central region serviced by KDBC included 10 counties in two provinces (Gyeong Gi and Chung Nam). Under Project II, one more county, Dangjin (Chung Nam Province) would be added to the Central region. The Honam region would be expanded from 12 to 16 counties. The new counties would be Boseong, Gwangyang and Yeocheon (Jeon Nam province) and Gochang (Jeon Bug province).

3.10 A new region Yeongnam, would be included in Project II. It lies in the south-east of Korea, 50 to 150 km north east of Busan. The Project area would include five counties, namely: Yeongil, Yeongcheon, Weolseong, Gyongju, Gyeongsan in the Gyeong Bug province and two counties, Ulsan and Ulju, in the Gyeong Nam province.

E. Detailed Features

3.11 The Project would provide financing for 400 existing farms (230 in the Central region and 170 in the Honam region), and 450 new farms (50 in the Central region, 85 in the Honam region and 315 in the Yeongnam region). The number of imported heifers required to top-up existing Project I farms to 8 cows is 1200; 610 would be distributed to the Central region and 590 to the Honam region.

3.12 Pasture and area development would include clearing of brush, plowing, fertilizing, sowing grasses and legumes, fencing, and improvement of the access road to the farm. It is anticipated that each farm has at

least 1.5 hectares suitable for fodder cropping. Based on available experience, the most promising pasture species for the project areas are orchard grass, tall fescue, perennial ryegrass, italian ryegrass and white clover. Pastures would be fertilized annually with 200 kg of urea, 500 kg of fused phosphate (20% P_2O_5) and 250 kg of potash (60% K_2O) per hectare. This heavy application of fertilizer reflects low fertility and rapid fixation of phosphates in the acid soils. The expected pasture life is about five years. Maize, ryecorn and forage sorghums grow well and would be used for silage and forage production for winter feeding.

3.13 Animals would be housed in conventional stall barns and, in general, would be hand milked. The owner and one cowhand would manage up to 10 milking cows, including all routine farming operations. Equipment to be provided for each farm in the Project would include a small silage cutter, one third share in a petrol motor for the cutter, an electric fence, milk cans and a milk cooler. A well, hand pump, piping and a trough would be provided to ensure an adequate water supply. The cowhand would be provided with simple housing in the cowbarn and a haybarn would be erected with sufficient storage space for fertilizers and machinery. Simple silage pits would be built to store winter feed.

3.14 Farmers are expected to follow existing practices of cattle housing and stall feed their animals in the first few years of the Project. With improved knowledge of pasture management obtained from upgraded field extension services and increased herd size, farmers would increasingly be expected to graze animals to alleviate the increasing cost of labor required to feed animals. When weather prevents grazing, cattle would be fed chopped fodder supplemented with concentrate feeds, and in winter, silage made from forage crops, hay and concentrate feed. Under the Project, the farm plan envisages concentrate feeding to be about 1,250 and 700 kg annually per head of milk cow and growing stock, respectively; a drastic decrease of about 150% on usual levels in Korea. Carrying capacity would increase to 1.75 animal units per hectare with about 30% of total feed provided by concentrates. Natality is calculated at 80%, mortality at 10% for calves and 3% for animals over one year of age. Milk production would average 3.0 mt per year for the first lactation and increase to 4.0 mt at maturity. These parameters are based on the experience of Project I farms. Total investment cost for the establishment of each new farm (excluding contingencies) would be 17.9 million won (US$16,400), of which 3.8 million won (US$8,000) would be for the purchase of livestock.

3.15 Development of existing Project I farms would provide for the purchase of additional pregnant heifers to raise the cow herd to 8, purchase of additional milk cans and cooler, renovation of existing pasture and establishment of additional pasture. These farms have adequate land, sufficient machinery and water supply and space in their cowbarns to accommodate the additional heifers and their progeny. Approximately 70% of Project I farms require additional investment to make them financially viable. 95% of the 396 farms in this group have on average 5 milking cows and require on

average assistance to purchase 3 additional heifers, renovate 4 ha of existing pasture, establish 2 ha of new pasture and develop 0.5 ha of additional forage cropland. Total incremental investment costs, excluding contingencies, for a 5 cow farm would be 2.2 million won (US$4,600). Of this amount about 1.5 million won (US$3,000) would be for the purchase of livestock.

Importation of Heifers

3.16 Participating dairy farms would be stocked with high-grade Friesian heifers, aged about 18 months, weighing around 300 kg, and certified pregnant. During the implementation of Project I, KDBC gained considerable experience in the purchase, importation and distribution of heifers. It is expected that the procedures they developed would be used for Project II. In total about 4,800 pregnant heifers would be imported and distributed to project farmers.

Milk Processing Plants

3.17 The Project would provide processing facilities to meet increasing milk flow on existing and new farms until 1987 (Annex 4 Table 2). The principal component would be a frozen milk products plant in the Yeongnam region with a basic capacity of 5,000 kg per hour for raw milk. This plant would enable KDBC to expand dairy processing and its farm technical services to new farm areas.

3.18 Investments in the Honam plant at Gwangju would include the extension of milk sterilizing equipment to raise capacity to a daily throughput of 60 mt of raw milk. This throughput would mean an increase of 50% in the production of high quality fluid milk for national sales. At the Central plant near Seoul, the Project would provide for the expansion of the evaporator unit and the purchase of an additional ultra high temperature heater which would enable KDBC to double milk drying capacity to about 80 mt per day. Provision has been made for additional equipment to utilize the drying capacity at the Central plant to produce a powdered coffee creamer, similar to CREAP which is marketed in Japan. A condensed milk evaporator would also be installed at the Central plant to provide for maximum production of baby milk powder and at the same time provide concentrated milk solids for the Yeongnam plant.

3.19 A milk separator/standardizer has been included in equipment purchases for each plant. These separators of 5,000 liter per hour capacity would clarify milk to provide additional butterfat (0.5% per liter) and thereby reduce butterfat costs at the Yeongnam plant and in the production of powdered coffee creamer at the Central plant. Two electric generators, 500 KVA, have been included for the Central and Yeongnam plants to alleviate production shut-downs during power shortages. Additionally, recently enacted Korean law will require the provision of waste treatment equipment at the Central plant by 1976.

3.20 Two 10 mt/day milk collection centers would be provided, one in the Central region, the other in the Honam region. These centers would improve flexibility in milk reception and would considerably reduce milk collection costs. Fifty small cooling stations for groups of farmers are also included in the Project to reduce milk spoilage and improve the efficiency of milk collection. One 10 mt tanker would be provided for each of the processing plants.

Technical Services and Training

3.21 The Project would provide technical support for:

(a) farm development planning;

(b) farm management and veterinary advisory services;

(c) farmer training;

(d) processing plant location studies, plant design and preparation of bid documents, and evaluation of bids for plant construction;

(e) product marketing studies;

(f) KDBC's financial management;

(g) applied research.

3.22 This support would either be an extension of, or supplementary to, the existing technical support offered under Project I (see Annex 6). The number of farm extension officers would be increased from 9, at present, to 21 by the third year of the Project and the number of technical specialists from 5 to 9. There would be one field extension officer for every 50 new farms. Four internationally recruited technical specialists would be engaged to provide technical support and training in dairy farm management, animal health and nutrition, pasture management and forage crop production, and milk processing. Annex 6, Table 1 summarizes the man-years of technical support and training staff which would be provided under the Project. Cost recovery and compensation for the public service functions of KDBC in administrating and financing on-farm development and technical services would be met by the spread on funds from IBRD and Government on-lent to farmers.

3.23 New dairy farmers would be trained for four weeks at the Korea-New Zealand Dairy Demonstration Farm at Pyongtaek before they receive cattle. Farmers on existing five cow farms would be required to attend a 10 day training course before they would be eligible to receive additional cattle. A one week refresher course would be offered farmers one year after receiving their cattle and regular one day seminars would be held in each of the three milk producing areas for the first four years of the Project.

3.24 The diversification of KDBC production as proposed, and in particular commencement of the production of frozen milk products, necessitates considerable strengthening of the KDBC marketing department. A technical service agreement on a fee paying basis would be sought for the technical service required for start-up of the Yeongnam plant.

3.25 Pasture and forage crop trials initiated during Project I, particularly those investigating optimum fertilizer application rates, would be continued and extended into the Yeongnam region. Nutritional studies would be undertaken to determine profitable mixes of pasture, conserved forage and concentrate feeds. Calf rearing trials, including an evaluation of milk replacers would be initiated. The overall objective of Project research work would be to provide improved management recommendations for Project farmers. To this end the Project would also provide a farm records analyst to determine the most profitable and efficient means of smallholder dairy production.

3.26 Motor cycles would be purchased for use by the field extension officers. To facilitate mobility of the technical specialists and advisors, four jeeps would be purchased and distributed one to each of the processing plants and one to KDBC headquarters in Seoul.

3.27 Environmental Impact. The Project would have no adverse effect upon the environment. Under Government law, land clearing for pasture establishment is restricted to slopes less than 30% which have a density of forest less than 30%. Pasture cover and controlled grazing would help to prevent eerosion in these areas. The provision of waste water treatment facilities in each of the processing plants would ensure that the levels of effluents would be well below the standards set by the Bank.

F. Project Costs

3.28 Total project cost over a seven year period is estimated to be US$24.5 million of which foreign exchange costs would be US$15.0 million (61%). The total cost estimated includes a 10% physical contingency on all items except technical services and farm working capital. All base cost estimates are in April 1975 prices. Expected price increases were derived by applying to project costs the following rates of annual price escalation: equipment, machinery and vehicles - 1975, 20%; 1976, 10%; 1977 and thereafter 8%; civil works - 1975, 18%; 1976, 14%; 1977 and thereafter, 12%. Details of Project costs appear in Annex 8. Project costs are based on the assumed buying rate of 480 won to the dollar, rather than the official parity rate of 485. The one percent difference, amounting to an increase in local costs of US$100,000, would be accommodated in the allowance for price contingencies. A summary of project costs follows:

Table 1: SUMMARY OF TOTAL PROJECT COSTS

Category	Won (million) Local	Foreign	Total	(US$ million) Local	Foreign	Total	% of Total Project Cost	Foreign Exchange Cost as % of Total
Dairy Farm Development								
Pasture Establishment	648	-	648	1.35	-	1.35	8	-
Crops	189	24	213	.39	.05	.44	3	11
Buildings, Plant, Water	950	172	1,122	1.98	.36	2.34	13	15
Livestock	239	2,152	2,391	.50	4.48	4.98	28	90
Pasture Renovation	47	20	67	.10	.04	.14	1	29
Incremental Farm Working Capital	48	192	240	.10	.40	.50	3	80
Sub-Total	2,121	2,560	4,681	4.42	5.33	9.75	56	55
Dairy Processing Facilities								
Yeongnam Plant	512	1,257	1,769	1.07	2.62	3.69	21	71
Honam Plant	56	95	151	.11	.20	.31	2	65
Jinui Plant	104	280	384	.22	.58	.80	4	73
Start-up Materials	303	496	799	.63	1.03	1.66	10	62
Sub-Total	975	2,128	3,103	2.03	4.43	6.46	37	69
Technical Services	96	528	624	.20	1.10	1.30	7	85
TOTAL BASE COSTS	3,192	5,216	8,408	6.65	10.86	17.51	100	62
Physical Contingency /a	274	400	674	.57	.83	1.40	-	59
Price Contingency /b	1,078	1,584	2,662	2.24	3.31	5.55	-	60
TOTAL PROJECT COST	4,544	7,200	11,744	9.46	15.00	24.46	-	61

/a Physical contingency on dairy farm development and dairy processing costs only, excluding incremental farm working capital and start-up materials.

/b Details of price contingency are contained in Annex 8. No price contingency on incremental farm working capital or plant start-up materials.

G. Proposed Financing

3.29 The proposed IBRD loan of US$15.0 million would finance about 61% of total project costs and would cover all foreign exchange costs. The IBRD loan would be lent to Government at 8.5% for 25 years, including 7 years of grace. Total project cost of 11,744 million Won (US$24.5 million) would be financed as shown in Table 2. Further details of the sources of funding and terms for project lending are given in Annex 8, Tables 1 and 2.

Table 2: PROPOSED FINANCING
(million won)

Category	Financed by: Farmers	Government: MAF Subsidy	Government: NACF Loan	KDBC	IBRD	(%)	Total Amount
	(Amount)						
Dairy Farm Development/a	1,254	362	1,500	-	3,560	53	6,676
Dairy Processing Facilities /b	-	-	-	1,297	2,910	69	4,207
Management and Technical Services	-	-	-	131	730	85	861
Total (million won)	1,254	362	1,500	1,428	7,200	61	11,744
Total (US$ million)	2.61	.75	3.12	2.97	15.00	61	24.46
Percent of Total	11	3	13	12	61	-	100

/a Includes farm working capital.

/b Includes start-up materials for dairy processing plants.

3.30 Government contributions (US$3.9 million) would finance 16% of total project costs. The contributions would include an NACF loan (US$3.1 million) which would finance local costs of working capital for farmers, pasture establishment and farm building, water supply and plant costs, and all local cost contingencies for dairy farm development. The NACF loan would be provided to KDBC with an interest rate of 9% with 9 years repayment including 4 years of grace. In addition, there would be a direct subsidy (US$0.8 million) from MAF to farmers for pasture establishment. To minimize the financial burden on KDBC, Government has agreed to assume the foreign exchange risk for IBRD funds used for farm development and technical services (Annex 8).

3.31 The farmers' contributions (US$2.6 million) would finance 27% of total dairy development costs, excluding contingencies. New and existing

farmers would expect to receive loans from KDBC for 70 to 75% of their on-farm investments. KDBC would use NACF funds for farm loans amounting to 30,500 won per ha for pasture establishment and about 711,000 won per new farm for buildings, plant, and water investments, excluding price and physical contingencies.

3.32 The required capital by KDBC to implement the Project is about US$3 million. About 70% of this amount would be used to finance the local cost component of investments in dairy processing; 20% would finance local costs of working capital for processing plants, and 10% for cost incurred in management and technical services. Increases to share capital of KDBC would be 120 million won by January 1976, 450 million won by November 1976, 200 million won by April 1977, 300 million won by February 1978, and 357 million won by January 1979. Increased capitalization would raise total share capital of KDBC to US$4.2 million (2,027 million won). Details of required capitalization of KDBC by private individuals and AFDC ownership are contained in Annex 8, para. 16. The additional funds would be provided either through a share capital increase or through bridging loans to KDBC from NACF or other appropriate Government agencies, or a combination of both.

H. Procurement

3.33 International competitive bidding pursuant to Bank Guidelines would be applied for the purchase of machinery, equipment and start-up materials for dairy processing facilities (US$3.9 million). Vehicles to serve the dairy processing facilities (US$285,000) and civil works contracts for the construction of the dairy processing facilities (US$1.62 million) would be awarded on the basis of competitive bidding advertised locally in accordance with procedures satisfactory to the Bank. Foreign contractors would be eligible to bid. This arrangement is considered appropriate since the Korean construction industry is experienced, efficient and competitive and several local plants, each with a foreign affiliate, ensure a competitive and adequate supply of vehicles. The site, plans, specifications, procurement and construction contracts for the dairy processing units would be subject to the approval of the Dairy Processing Specialist.

3.34 For the purchase of cattle (US$4.48 million), to ensure adequate competition KDBC would submit to the Bank for its agreement a list of at least three countries from which suitable disease free livestock would be imported. After agreement on the list, quotations would be sought from suppliers in these countries.

3.35 Other goods required for dairy farm development such as farm machinery, milk cans, fencing, fertilizers, seeds and farm structures would be obtained through existing commercial channels. International competitive bidding would not be appropriate since individual contracts would be small and numerous and the size and combination of farm investments would vary

considerably. There are no discriminatory import quotas or controls. Imports of cattle, farm machinery, and dairy equipment are exempt from import duties.

3.36 Internationally recruited technical specialists would be selected from short lists approved by the Bank. Vehicles and motorcycles (US$32,000) required for the technical services component of the Project would be procured on the basis of competitive bidding advertised locally.

I. Disbursements

3.37 IBRD disbursements are expected to extend for six years from 1976. Disbursement scheduling of IBRD funds is shown in Annex 8, Tables 2 and 3. IBRD would disburse against appropriate documentation of expenditures under the Project:

(a) Imported Cattle, 100% of c.i.f. expenditures;

(b) Loans for Farm Development (excluding cattle) 25% of the funds disbursed by KDBC to participating farmers;

(c) Dairy Processing Facilities, 100% of foreign expenditures for imported machinery, equipment, plant start-up materials, milk-tankers and trucks, or 100% of local expenditures based on ex-factory cost; 44% of civil works expenditures;

(d) Technical Services, 85% of total expenditures (net of tax) for management and consultant services to include emoluments, international travel, housing and research allowances; 85% of total expenditures for jeeps and motorcycles.

J. Accounts and Audit

3.38 The accounting and auditing system of KDBC developed under Project I would be maintained and strengthened through technical assistance provided under the Project. Qualified public accountants would develop a suitable accrual accounting system in order that accurate statements of the cost of sales per processing plant would be available on a timely basis. The system would also be expanded to include the new Yeongnam region. The proposed addition of a farm records analyst would improve accounts containing on-farm information and farmers' loan status. KDBC would continue to submit quarterly and annual reports to IBRD within 30 days of the close of the respective periods.

IV. MANAGEMENT AND ORGANIZATION

A. The Korea Dairy Beef Company

4.01 KDBC, executing agency for Project I, would continue as project authority for this Project. KDBC is a quasi government institution with 40% of its share capital owned by Government (AFDC), and 60% held by private shareholders. The Company has a vertically integrated set of responsibilities which extend from on-farm development to milk processing.

4.02 KDBC is organized in seven principal departments: (i) Administration, (ii) Finance, (iii) Technical Services, (iv) Dairy Processing, (v) Marketing, (vi) Planning, and (vii) Business. KDBC's staff now totals 315 of which 122 are employed in the Central plant, 77 in the Honam plant, 101 in the Seoul office and 15 on the Korea-New Zealand Farm. In the short time that KDBC has been in operation, it has demonstrated strength in technical and quality control aspects of processing, in engineering planning and execution, and in on-farm development. The Company performs quality antibiotic milk testing and now pays farmers on the basis of the fat content of milk. Production tests are being capably handled for pilot scale production of a powdered coffee creamer. In some areas, KDBC's management will need strengthening. The Company has experienced difficulties in procurement administration. Sales and processing activities demand greater integration by KDBC staff, and a more aggressive marketing structure needs to be established. A product marketing specialist familiar with Korean milk products would be hired by KDBC.

4.03 As the executing agency for the Project, KDBC would be responsible for (a) planning, disbursement and supervision of farm development loans; (b) planning, financing, construction and operation of milk processing facilities, (c) pasture, fodder crop and animal nutrition applied research, (d) product marketing and market research, (e) local training of KDBC staff and participating farmers and the provision of a farm extension program, (f) organizing contracts to reduce where possible farm input costs, and (g) organizing the importation of essential project inputs. An organization chart of KDBC and additional details of its management are given in Annex 3.

B. Lending Operations

4.04 Project lending terms and criteria are detailed in Annex 8, para 6. Farmers receiving loans for buildings, plant and livestock from KDBC would pay 12% p.a. on both those funds originating from IBRD and NACF. KDBC loans for pasture establishment would be lent to farmers at 9%. KDBC would

make all loans repayable in 9 years, including a 3 year grace period during which only interest would be paid. These terms and conditions would conform to those applied to Government loans for similar purposes. Farm loans would be made by KDBC to a maximum of 75% of on-farm investment costs. A portion of total farm loans may be provided in kind. Principal security for a loan would be a grassland mortgage. Recovery of loans to farmers would be assured in assignments by borrowers of their milk sales to KDBC milk plants in an amount sufficient to cover the payment terms of their contracts. Borrowers would also take an insurance policy under the national livestock insurance program administered by KDBC and, where necessary, pledge such policy as security against a loan.

V. PROJECT PRODUCTION MARKETING AND PRODUCT PRICES

Product Prices

5.01 Government has sought to encourage investment in the dairy industry by milk processors. Its basic policy has been to maintain profitability by guaranteeing basic prices, by promoting efficient marketing systems, and by allowing higher prices for quality goods. At present, the Government establishes minimum prices for milk at the farm gate, guides maximum ex-factory prices for fluid milk in bottles, and controls the ex-factory price of baby milk powder. Prices for other dairy products e.g. flavored milks, prepack and tetrapack fluid milk, as set by producers, must be justified to the MAF in consultation with the EPB. Whole milk, other milk powders and ice-cream, prices are uncontrolled.

5.02 The most important price setting mechanism is that for milk at the farm gate. Government sets guide prices for processed products on the basis of the processors' margin. The margin between the official minimum farm gate price (companies have paid more than the official minimum since mid-1974) and the ex-factory price has steadily increased since 1967. Expressed as a percentage of the ex-factory price this margin has gone from 28% in 1967 to 40% in June 1974. The margin is presently about 34% since the major processors decided in March 1975, to pay 120 won per liter of raw milk. A review of the terms of trade of farmers since 1969 indicates that a margin between 33 to 36% would assure the profitable operation of both farms and processing plants. Examination of the trend in farm-gate prices and margins (Annex 2, Table 4) from 1969 to 1975 shows that Government has sought to maintain the equilibrium margin within this range.

5.03 Justification for financial benefits of the proposed Project is found, in part, by Government action to protect the milk price and the processor's position. When difficulties were encountered, such as the temporary surplus of milk products in 1971-72 Government took remedial action by purchasing commercial fluid milk and arranging its sale for school distribution at heavily subsidized prices. Government's forward planning for KDBC has been predicated on the basis of the anticipated market requirements

for milk products and the availability of suitable pasture land for dairy development. The Project has been designed with the Government's policies in view and is fully consistent with them.

Marketing

5.04 Marketing analyses for the Project suggest that KDBC should have no problem in selling its milk products. Projections by MAF of the national supply of milk products indicate a rate of growth of supply of approximately 18% per annum after 1976. Market indications suggest a national demand growth rate of 20%. KDBC's share of national milk production at full development would increase from 5% to about 10% with the expansion under the Project.

5.05 Production from the proposed Yeongnam plant would supply the most rapid demand growth area for milk products in Korea, the Yeongnam - Busan region, where milk product sales are projected to increase by 30% a year. At present frozen milk products are trucked to Busan City (population 2 million) from Seoul 350 km away. The estimated demand for ice-cream in this region is estimated to be 4 kg per head per annum by 1980. The KDBC plant would supply about half of this demand. Any excess demand for inputs during the summer peak would be met by trucking milk solids as concentrate or powder from the Central and Honam plants.

5.06 The expansion of drying facilities at the Central plant would improve KDBC sales of baby milk powder and other milk powders. Demand for baby milk powder is expected to continue to expand at a minimum of 12% per annum. KDBC has sufficient flexibility in its plant operations to offset any short term slack in demand for baby milk powder by directing raw milk supplies into the production of whole milk powder for which demand has increased about 30% per annum.

5.07 KDBC's program of diversification into new product lines includes the production of a powdered coffee creamer for which there is an excellent and growing market. The forecast of demand increase to 1979 based on imported varieties is about 20% per annum and a minimum of 12% thereafter. Projected levels of production by KDBC for powdered coffee creamer and other products in the proposed Project are safely within demand limits.

5.08 Demand for fluid milk is expected to increase at a minimum of 15% per annum. The share of KDBC in the national supply of fluid milks, bottled and packed, would represent about 6%. No provision for investments in an additional fluid milk plant has been made in the Project for the Central region as proposed in the FAO/IBRD Preparation Report. The volume of processed milk available for sale in the Seoul area does not justify the expense of KDBC, in effect, competing with its own tetrapack sterile milk produced in Honam and then sold in Seoul.

VI. PROJECT BENEFITS AND JUSTIFICATION

A. Financial Results

6.01 Net income for new dairy farmers would be 2.8 million won at full development. The addition of three cows to the existing five cow farms would raise farm income from 0.7 million won to 2.8 million won at full development with the additional investments under Project II. Cash flow analysis indicates that new farmers would have positive net cash flows from year 3 of the Project, while existing farmers would reach positive net cash flow in year 1 of the Project.

6.02 The financial results of Project farms and the parameters used for income and costs in farm budgets are detailed in Annex 4. New farms have an estimated rate of return of 20%. The analysis for existing farms is based on the marginal costs and benefits that accrue from the Project. Existing farms have an estimated rate of return of 28%, appreciably higher than for new farms since existing farms can support the increase in herd of three cows without further investments in buildings, water supply and farm plant.

6.03 A margin of flexibility in the terms of trade for Project II farmers would be 5 to 10%. Sensitivity analysis shows that the rate of return for new farmers is increased to 25% when the milk price is increased by 10%, and decreases to 15% when the milk price decreases by 10%. The rate of return for existing farms is increased to 34% and decreased to 23% when the same sensitivity is applied.

Milk Processing Plants

6.04 The proposed Project at full capacity would supply 5,470 mt of sterilized milk at Honam with a market value in constant prices of US$2.8 million. The Central plant would produce an additional 1834 mt of baby powder milk, marketable at about US$5.1 million and 466 mt of powdered coffee creamer marketable at about US$1.9 million. The Yeongnam plant would produce 11,000 mt of ice cream with a value of US$17.7 million (Annex 5, Tables 2, 3 and 4).

6.05 The ratio of net earnings to total sales at the Honam plant is comparable to dairy processing activities elsewhere in Korea, about 7%. This ratio for the Central plant, given the high profitability from coffee creamer production, is 15%. The proposed Yeongnam plant has the high net earnings to total sales ratio of 19%. Government does not control the price of frozen milk products and the current margin between the farm gate price of fluid milk and the ex-factory price of these products is seven to eight times as high as the difference between the farm gate price of fluid milk and the price of bottled milk in Korea. The Yeongnam plant will account for about 60% of all KDBC sales and about 70% of all profits at full capacity

on all plants. The proposed Project including production from both Project I and Project II would generate annual operating surpluses at full development of about US$15 million in current prices before taxes and financial charges (Annex 3, Tables 2 and 3).

6.06 The financial viability of the proposed expansion of the two existing plants, Honam and Central, was determined from increased production and net incomes derived from the use of the incremental raw milk from farms in Project II. Forecast production at the Yeongnam plant was based on the milk flows from Project farms in the Yeongnam area and an inflow of 20% per annum of whole milk powder produced at the Central Plant. Parameters for production inputs, operating costs, and overheads are detailed in Annex 5.

6.07 The rates of return on the proposed processing components are excellent. Central plant expansion would have a rate of return of 37%; the Honam expansion, 31%; and the Yeongnam plant, 37%. Fluctuations on plant income should not exceed 10% at the maximum. Sensitivity analysis on this basis shows that the rate of return for the Central plant is increased to 54% when the sales price is increased 10% and decreased to 12% when the sales price is decreased 10%. Similarly, the rate of return of the Yeongnam plant increases to 53% and decreases to 16%. Production at Honam is the most sensitive to price changes given its relatively high proportion of the price of milk in the finished product. The Honam expansion increases to 78% when the sales price is increased by 10% and is negative when sales are decreased 10%.

6.08 The need for KDBC's diversification in highly profitable products such as powdered coffee creamer and frozen milk items is underscored by the Company's present financial condition. The net loss for 1974, the fourth year since Project I commenced, is 61.4 million won and the Company's loss carried forward is now 84.3 million won. Financial projections for Project I show that KDBC should have positive net cash balances from 1976, but KDBC is currently financing deficits through costly short-term borrowings and is operating with insufficient working capital. Project II would significantly augment KDBC's profitability. Projections of net profit for KDBC with Project II expansion and diversification would be about 1.0 billion won by 1978 (current prices), 2.8 billion won by 1982, and 3.2 billion won at full development in 1987 (Annex 3, Table 5).

6.09 Government has sought to assist KDBC in its financial situation by proposing to bear the foreign exchange risk for on-farm development funds in Project II. KDBC is currently required in Project I to bear the risk on all IDA funds from Government. Prior to December 1974, KDBC's long-term liabilities payable to IDA had increased by US$386,000 as a result of two won devaluations and one dollar devaluation. The recent won devaluation by 17.5% has increased KDBC's long-term liabilities by an additional US$1.6 million. In calculating further foreign exchange risk at an annual devaluation rate of 3% per annum for the life of the loan, the estimated additional payment by KDBC is about US$2.5 million. Total long-term liabilities, including

actual risks incurred, would be US$4.5 million for Project I. The high profitability from KDBC diversification and expansion to be carried out under this project would generate a surplus for KDBC and resolve debt-servicing problems.

B. Economic Analysis

Increased Production

6.10 At full development Project farms would produce about 22,600 mt of raw milk per year which would add to the national production of processed milk products by 5,470 mt of sterilized milk, 1,834 mt of baby milk powder, 466 mt of powdered coffee creamer and 11,100 mt of frozen milk products. In addition, national beef production would be increased by 900 mt per year. The Project would directly benefit 850 farm households and would develop about 4,600 ha. of unutilized land and 2,000 ha. of partially developed land.

Employment and Social Benefits

6.11 Four hundred and fifty new farm households with a total population of about 2,250, and 400 existing households comprising 2,000 people would benefit from the Project. In addition, on-farm employment at full development would be created for 800-1000 permanent workers and about 3,500 casual laborers. The capital cost per full time job created including those employed in farm households would be about US$3,000. This compares with US$8,800 per industrial job created according to recent experience in Korea. The proposed development of the milk processing facilities and the additional staff required in KDBC to implement the Project would provide an additional 155 jobs. Although the available data on nutrition and consumption patterns in Korea are not comprehensive, given the per capita income and the very substantial increase of high protein milk products that will result from this project, it is likely to prove to be nutritionally beneficial.

6.12 The Project would support Government in its efforts to place increasing emphasis on agricultural projects which enable farmers to diversify their production and utilize their labor more fully. The Project would afford farmers the opportunity of utilizing their labor year round, of spreading their risk between crop production and milk production, of building a revenue earning asset from previously unproductive upland, and of sharing improvements to public utilities such as roads, rural electrification, educational and medical facilities, stimulated by development of this type.

6.13 The Project reflects both the technology of dairy development and the overall strategy for rural development proposed by Government. Rural development in Korea is being pursued mainly through structural changes in the rural economy which the Government intends to bring about by rapid expansion of decentralized industrial employment and by consolidation

of agricultural resources into viable production units capable of maintaining or improving the relative income position of farmers in the industrialized economy. To this end, the Project would complement other projects which the Bank Group is financing or proposes to finance in 1976.

Economic Rate of Return

6.14 The economic rate of return was obtained after the adjustment of the main benefits and costs valued in terms of border prices or the border prices of their tradeable components, by the elimination of taxes and subsidies (Annex 7). The Project, after all adjustments, has an estimated economic rate of return of 15%. This is somewhat lower than the financial rate of return reflecting the Government's desire to develop the dairy subsector albeit at some economic cost, since the c.i.f. prices of importable milk products are currently lower than the cost of production of such products locally.

6.15 The Project is expected to generate total foreign exchange savings of about US$27 million. Summary calculations of foreign exchange savings are contained in Annex 7, Table 2.

VII. RECOMMENDATIONS

A. Assurances

7.01 During negotiations assurances were received from Government and KDBC that:

(a) proceeds of the IBRD loan would be on-lent directly to KDBC (para 3.29);

(b) NACF would provide funds to KDBC, promptly as needed, upon terms and conditions satisfactory to IBRD (para 3.30);

(c) after the initial increase in share capital, additional paid-in shares would be 450 million won by December 1976, 200 million won by April 1977, 300 million won by February 1978 and 357 million won by January 1979, upon terms and conditions satisfactory to IBRD (para 3.32). In the event that the necessary share capital is not forthcoming on the scheduled dates, NACF or other appropriate government agency will provide a bridging loan to meet the shortfall;

(d) the terms and conditions of employment of the four technical advisors would be determined in agreement with IBRD (para 3.22);

(e) the Dairy Husbandry specialist and the Dairy Processing specialist would be employed by KDBC within 2 months of effectiveness of the loan (para 3.22);

(f) exotic dairy beef heifers would be procured on the basis of bids from at least three countries where animals suitable for the Project are available (para 3.34);

(g) a Product Marketing specialist familiar with the Korean milk products market would be hired by KDBC not later than February 28, 1976 (para 4.02); and

(h) during the disbursement period of the loan, KDBC would make appointments to the positions of President, Executive Vice President, Managing Director, and heads of the administrative and operational departments, in consultation with IBRD (para 4.03).

B. Effectiveness

7.02 In addition to the above assurances, the following requirements are condition of effectiveness:

(a) KDBC's share capital be increased by 120 million won (para 3.32); and

(b) the transfer of title to the Korea - New Zealand Demonstration farm from AFDC - KDBC (para 3.23).

KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Agriculture and the Livestock Industry

A. The Rural Sector

1. About 45% of Korea's population of 33 million live in rural areas. Of these 14.6 million people, 5.7 million are considered to be economically active; employment is close to 100%. Rapid growth of employment opportunities in the non-agricultural sectors caused many rural people to move to urban areas during the 1960's. This migration continued into the early 1970's. Projections made by the Government in 1972 indicated that total farm population could be expected to decline 24% and employment in agriculture, forestry and fishery, 8% from 1972 to 1981.1/ However, farm people classified as economically active and employed increased 6% from 1971-1972 and 5% from 1972 to 1973. Workers classified as employed in agriculture, forestry and fishery (including those in non-farm households) increased 9% in 1972 and 5% in 1973. Korean officials attribute this recent growth of employment in agriculture to increased prosperity in rural areas, but it probably was due mainly to an unusually large number of farm people joining the labor force in the last few years. The slow-down in industrial growth anticipated for 1975 may further retard the growth of non-farm job opportunities for rural people and cause a further increase in farm employment before the long-term downward trend in farm employment is resumed.

2. There are 2.5 million farm households in Korea with an average size of 1 ha. The percentage distribution of farm households and cropland area by size of farm in 1973 is given in Table 1.

1/ An Outline of Long-Range Projections for 1972-81, MAF, September 20 1972.

Table 1: Percentage Distribution of Farm Households and Cropland Area by Size of Farm, 1973

Size of Farm (ha)	Percent of Total Farm Households	Percent of Total Cropland	Average per Farm Cropland (ha)	Average per Farm Household Income (000 won)
0 - 0.5	35.9	11.4	.27	284
0.5 - 1.0	31.5	26.9	.74	400
1.0 - 1.5	18.1	25.3	1.21	543
1.5 - 2.0	8.2	16.1	1.70	686
over 2.0	6.3	20.3	2.80	972
Total or Average	100.0	100.0	.86	481

/a Net farm income plus income from other sources.

Source: Yearbook of Agriculture and Forestry Statistics, 1974, MAF.

3. Roughly 40% of rural households have less than 0.5 ha of cropland and are heavily dependent upon income from work on other farms and non-farm jobs. About half of the population in the lowest 40% income category in Korea live in these households. The other half are low family-income families in urban areas. Farmers to be developed under the Project are in the top 1.0% of farms in terms of the national distribution of farm size, but since much of the farm area is not cultivable average net farm incomes, per household are currently in the order of 300,000 won per household, i.e. about half of the national average.

4. A comparison of average incomes of rural and urban households is given in Table 2. Parity of income for rural people with people in urban areas has been a major policy goal of the Government in recent years. Consequently it is significant that rural household incomes averaged almost as high as those of salary and wage-earner households in urban areas in 1974. The major factors causing rural incomes to rise have been the introduction of Government price programs to raise the prices of farm products relative to prices paid by farmers for inputs and consumption items. Since rural households are larger and have more workers per household than urban households however, per worker incomes still average 46% lower in rural than in urban areas (see Table 2).

Table 2: Average Incomes of Rural and Urban Households
(000 won)

	1971	1972	1973	1974 /a
Rural Households				
A. Household Income	356	429	481	639
B. Per Capita Income	61	75	84	118
C. Per Worker Income	122	144	164	218
Salary and Wage Earner Households (all cities)				
D. Household	452	517	550	647
E. Per Capita Income	86	98	105	123
F. Per Worker Income	340	386	405	476
Ratios				
A/D	79	83	87	99
B/E	71	77	80	96
C/F	36	37	41	46

/a Preliminary estimates.

Source: Economic Planning Board.

5. Since the Farm Land Reform Law of 1950 almost all the 2.3 million ha of cultivated land is owner operated. Some 58% or 1.4 million of rural households also hold title claim to about 73% of all remaining land, officially classified as forest. This land was exempt from the Farm Land Reform Law and is subject to traditional restraints incorporated within the Korean concept of property rights. These permit the remaining 42% or 1.1 million farm households with entirely cultivated land, to carry user rights and treat as resources (in terms of forage, fuel and composting materials) all forest areas, be they State or privately owned. Although these traditional rights can be a barrier to effective utilization of upland areas, experience gained in the Integrated Dairy/Beef Development Project (Credit 234-KO) suggests that few difficulties would be encountered in the proposed Project. This is particularly true now that the Grassland Law enacted in January 1969 has gained acceptance by private land holders.

6. In recent years, particularly since the initiation of the SaeMaeul (New Community) Movement in late 1971, Government has made a major effort to improve the quality of rural life. General village improvements have included resurfacing and widening of village lanes, clearing and rearrangement of village streams; installation of public laundry and bathing facilities,

erection of village halls and post offices; installation of rural electrification systems; establishment of telecommunication facilities and construction of small health clinics. In order to raise off-farm cash incomes and to reasonably utilize idle rural labor, the Movement has sponsored the establishment of labor intensive industries in small cities throughout the country. With the expansion planned for the Movement in the next few years, it should not be long before environmental improvements and the provision of economic infrastructure narrow the socio-economic disparities between rural and urban areas.

B. Recent Trends in Agricultural Production

7. During 1963-72, real GNP rose at an average annual rate of about 10%. The driving force behind this growth has been the expansion of industrial exports which in 1972 rose to 26% surpassing that of agriculture for the first time. Agricultural production has expanded by a creditable 3.5% per annum during 1962-72 and in 1974 accounted for 25.5% GNP. Most of this increase has resulted from increased yields, double cropping and diversification of production. Trends in the share of the agricultural sector in GNP are summarized in Table 3.

Table 3: Value Added in the Agricultural Sector[/a]

Year	Current Market Prices		Constant 1970 Prices	
	Billion Won	% in GNP	Billion Won	% in GNP
1965	295.50	36.7	574.69	37.6
1969	562.78	27.0	689.76	28.8
1970	678.16	26.1	678.16	26.2
1971	848.35	27.0	682.65	24.5
1972	1,024.27	26.5	688.02	22.2
1973	1,137.12	23.3	710.28	20.0
1974	1,615.82	25.5	745.00	19.5

/a Includes Agriculture and Forestry; excludes Fishery.
Source: IBRD, Economic Report, Volume II, February 20, 1974 and Bank of Korea, April, 1975.

8. The composition and annual percentage increases in GNP of the agricultural sector is shown in Table 4.

Table 4: Composition and Annual Percentage Increases in GNP of the Agricultural Sector (1970 prices)

	Composition in 1974 (%)	% Increase per Year			
		1962-72	1973	1974	1975 Plan
Crops	72.0	2.5	2.7	5.1	2.2
Livestock	6.8	4.4	6.4	7.5	5.0
Other (sericulture, etc.)	2.4	-	-	-	-
Agriculture, Total	81.2	2.6	2.7	5.3	2.4
Forestry	5.6	9.1	-	4.2	6.1
Fishery	13.2	12.1	31.3	18.6	15.0
Grand Total	100.0	3.5	5.5	6.9	4.0

Source: Economic Planning Board, January 1975.

9. Agricultural exports have followed a trend similar to that for the decline in the ratio of agricultural production to GNP. Although the exports of agricultural livestock and forestry products increased by almost 230% between 1966 and 1974, their contribution to total exports declined from 23% to 3% in the same period. The contribution of the sub-sectors to total exports is shown in Table 5.

Table 5: Exports of Agricultural and Forestry Products

	1966		1970		1972		1974	
Item	US$ '000	% in exports	US$ '000	% in exports	US$ '000	% in exports	US$ '000	% in exports
Agriculture	23,175	9.1	62,446	6.2	27,637	1.5	26,576	0.5
Livestock	1,175	0.7	1,843	0.2	10,189	0.6	16,941	0.3
Forestry	33,490	13.1	109,830	10.9	194,693	10.8	89,561	1,9
Sub-Total	58,417	22.9	174,119	17.3	232,519	12.9	133,078	2.8
Total Exports (cif)	260,000	100	923,000	100	1,729,000	100	4,671,000	100

Sources: IBRD, Economic Report, Volume II, February 20, 1974
Answers to Questions Submitted by IBRD Mission January 1975; prepared by MAF.

10. Foreign exchange earnings from agricultural, fishery and forestry exports have not kept pace with growing imports of grains and livestock products. Consequently Korea's trade deficit in the agricultural sector

(including fishery) increased from US$115 million in 1971 to US$333 million in 1974 and will total about US$360 million in 1975 due to larger grain imports (Table 6).

Table 6: Trade in Agricultural and Fishery Products
(US$ million)

	1971	1972	1973	1974	Plan 1975
Exports					
Agricultural Products					
Silk	48	52	73	59	73
Canned Food	5	9	21	23	27
Meat	1	8	7	17	21
Fruit	1	2	2	3	4
Vegetables	-	-	1	3	3
Others	8	7	29	28	16
Sub-Total	63	78	133	133	144
Fishery Products					
Exports Total	178	231	393	423	481
Imports					
Grains	273	287	462	640	743 /a
Livestock	22	49	87	116	100 /a
Total	293	336	549	756	843
Trade Balance					
Total for Products Listed	-115	-105	-166	-333	-362

/a Mission estimates
Source: MAF.

C. Terms of Trade on Farms

11. Government price policies in recent years have been concerned with raising prices of farm products and maintaining relatively low prices for purchased inputs in order to improve farm incomes and encourage increased production. The terms of trade for farmers (as measured by the ratio of prices received for all farm products to prices paid by farmers for all goods and services) increased 15% from 1970 to 1973 and also were favorable in 1974 (Table 7).

Table 7: Index Numbers of Prices Paid and Received by Farmers

	1970	1971	1972	1973	1974/a
Prices Received by Farmers					
All Farm Products	100	121	148	164	209
Rice	100	126	159	168	228
Barley and Wheat	100	136	177	184	215
Vegetables	100	96	99	102	147
Fruit	100	117	127	144	188
Livestock and Poultry Products	100	121	143	167	196
Prices Paid by Farmers					
All Goods and Services	100	114	131	143	188
Fertilizer	100	100	101	113	143
Terms of Trade, All Items	100	106	113	115	111

/a First nine months of 1974.
Source: Monthly Review, NACF, November 1974.

D. Livestock Production

12. In 1974 value added in livestock farming was less than 10% of the total for agriculture (Table 4). Until recently cattle were raised primarily for draft work. Demand for livestock products, however, has risen considerably in recent years with the rapid increase in per capita income and value added is rising sharply (Table 4). Consumption of meat, milk and eggs has more than tripled in the last 10 years. In the 1960s, most of the increase in demand was met by imported products, but since 1970 Government has sought to raise domestic production through legislation and the provision of subsidies and low interest loans.

13. There are 1.8 million cattle in Korea, all are native Korean cattle, except for 8,000 head of specialized beef breeds and 65,000 dairy cattle. From 1970-74 the number of draft cattle increased 40% and beef production about 55%. In the same period the number of dairy cattle increased 280% and milk production about 300% (Table 8).

Table 8: Number of Livestock and Output of Livestock Products

	1965	1968	1970	1972	1973	1974 (Estimates)
	Number of Livestock (In thousands)					
Draft cattle	1,314	1,193	1,271	1,333	1,417	1,775
Dairy cows	7	14	23	36	41	65
Beef cattle	1	3	3	4.8	6.3	8
Pigs	1,382	1,396	1,121	1,248	1,334	NA
Chicken	11,893	25,968	23,477	24,537	29,073	NA
	Output of Livestock Products					
Meat (thousand MT)	99.7	136.4	167.4	184.7	209.0	NA
Beef	(27.3)	(35.8)	(37.3)	(40.2)	(46.5)	(58.2)
Pork	(55.9)	(61.8)	(82.5)	(90.2)	(103.3)	NA
Poultry	(14.6)	(35.8)	(45.2)	(54)	(59.2)	NA
Other	(1.9)	(3.0)	(2.4)	(-)	(-)	(-)
Milk (thousand MT)	10.6	23.4	51.9	79.9	104.1	164
Eggs (million)	856.0	1,585.0	2,456.0	2,790.0	3,079.0	NA

NA: Not Available
Source: IBRD, Economic Report Volume II, February 20, 1974 and MAF estimates.

14. In 1972, the average herd size per owner family for native cattle was 1.2 head and for dairy cattle 9.2 head, Over one million of Korea's 2.5 million farm families keep cattle for draft power, and cattle for commercial purposes are raised on a little over 1% of all farm households. Most of the specialized beef breeds, mainly imported Aberdeen Angus, Brahman, Santa Gertrudis and Hereford cattle, are raised on large commercial ranches, particularly on Cheju Island.

15. Beef Cattle. Native Korean cattle are hardy animals but have a slow growth rate and a low fertility level of approximately 50%. When crossed with imported Friesians or imported beef breeds, the first generation's growth rate is increased by about 30%. Much of the low fertility and poor growth rates of native cattle can be attributed to inadequate feeding and poor herd management. Native cattle are usually confined to a small yard with rudimentary barn until required for draft work, and fed periodically through the day small quantities of concentrates and grass cut from surrounding hillsides. Mating occurs indiscriminately and even with adequate nutrition, cows have a poor milk supply and calves reach only 100 kg by about 6 months of age; (reasonable growth rates would be in the vicinity of 150 kg). Feed conversion ratios are believed to average 15-18 kg of total digestible nutrients for each kg of liveweight gain.

16. Offtake rates are 18-19% annually in spite of the low calving percentage. Of the total annual slaughter of about 350,000 head probably

325,000 are native cattle made up of 170,000 cull cows; 128,000 males less than 4 years; and 27,000 cull working males. The average carcass weight of 145 kg tends to confirm the belief that a relatively high percentage of males are slaughtered before reaching mature weight.

17. In recent years, specialized fattening farms have appeared, particularly in peri-urban areas. Two to three year old cattle are bought on the open market and sold after an intensive feeding period of approximately 100 days. Invariably the animals are stalled and handfed rice straw and native grass or hay, supplemented with about 2 kg of concentrates per day. On a few farms, corn silage or silage and hay from improved pastures is fed. The number of animals fed in a lot varies from three to eight, and three or four lots are bought and sold annually. This type of enterprise has recently become common in dairy producing areas where young male calves are readily available for fattening.

18. Dairy Cattle. Growth in the national dairy herd to the present level of 65,000 has been rapid, following large scale importation since 1961 of selected Holstein heifers and cows. From 1965 to 1973 inclusive, 16,575 dairy cattle were imported, and 5,300 were imported from January to November 1974. Over half the herd is located in the province of Gyeong Gi close to the Seoul city market; other important dairy provinces are Chung Bug and Chung Nam, each with about 10% of the herd and readily accessible to Seoul.

19. In 1973 about 5,500 farm families owned dairy cattle with an average herd size per family of 9.5 head. It is estimated that about 40% of farms have less than five cows. Average production per lactation in 1973 was 3,400 kg of milk, or 2,400 kg for all cows. The Holstein appears well adapted to Korean conditions and provides satisfactory milk yields under the present dairy management system. In addition to the above milk production, the dairy herd contributes about 15,000 head annually for beef production. The male progeny from the dairy herd are now fully accepted by beef producers and command a premium price for fattening.

20. Almost without exception, commercial dairy units have developed as non-integrated specialized operations. While this has tended to restrict dairying to larger land owners and those who have reasonable financial resources, it has allowed production of quality milk for processing in modern processing plants. The system of dairy production evolved during the last decade, depends basically on improved pasture supplemented with forage crops and purchased concentrates. Dependence to date on imported cattle together with the need for considerable investments in buildings and pasture has led to capital intensive units, investing US$2,000-2,500 per cow.

21. On most farms, cattle are confined to holding yards and handfed cut grass, silage, rice straw and concentrates intermittently through the day. Cows are kept indoors for about 6 months during the winter and again for several hours each day during hot summer months. On an average there are about 1.6 head on each ha of pasture which provides about 60% of roughage

requirements. About 25% of roughage is provided by forage crops, 10% by native grasses and the balance by rice straw. On an average, over 20% of total feed by weight is purchased concentrate, costing about $180 per lactating cow annually. On a national average per farm cost of concentrates totals nearly 50% of gross farm income.

22. Cows are milked twice daily; on 95% of farms, by hand. Milk is cooled in cans in water troughs and collected usually once per day in milk processing company or cooperative trucks. Payment is usually made fortnightly following deduction of farm input costs by the cooperative or milk company. Problems with milk quality have occurred mainly during the hot and wet periods from late June to early September. Many milk cooperatives and processing companies have introduced premium and penalty milk payments schemes to overcome the problem and stimulate the use of small 'in-can' milk coolers. Good farm and animal hygiene will also alleviate the problem. On many farms, however, summer milk cooling is very difficult due to an inadequate water supply. The most effective method for these farms seems to be grouping of milk supplies to a quantity sufficient to chill economically and a fast transport system to move the milk from farm to first cooling. Small trucks working on contract for a short period(s) daily would be suitable for this.

23. Animal health problems are similar to those occuring in any dairy industry. Additional problems have occurred with piroplasmosis during the first summer of imported cattle and mastitis and abortions with cattle shipped long distances. Piroplasmosis has caused few deaths, but body condition and milk production have been severely affected and recovery has taken six weeks or more. Veterinary services are mostly provided by private veterinarians practicing in each county, but most have little experience with dairy cattle. Most milk processing companies subsidize veterinary services.

24. Reproduction, as in any developing dairy industry is a problem. Artificial insemination is conducted nationally by the National Artificial Insemination Service under the National Agricultural Cooperative Federation. MAF operates five National Animal Breeding Stations which provide semen from selected bulls, but NACF retains responsibility for the provision of services to farmers through its 171 distribution centers. This overlapping in responsibility has led to inefficiency and excessive wastage and has been the focus of studies under FAO auspices in mid-1974. Comprehensive plans for improvement of A.I. services have yet to be forged by Government. In the meantime, Holstein semen is collected from bulls which have never been subjected to progeny tests. Low conception rates are attributed in many instances to poor hygiene, and poor techniques of semen collection and insemination. Farmers continue to find it difficult to detect cows on heat in time for insemination. The effect of these problems is that each cow is inseminated on average twice before conception occurs, at a cost to the farmer of about 3,000 won/cow.

25. Unit cost of labor at around US$40 per month per man is low by international standards, but more people are employed and total labor cost becomes very high. The average labor cost per kg of milk produced in Korea is more than double the cost in USA or New Zealand, although unit costs of labor in those countries is about 10 times greater than in Korea. Nearly all dairy operations are manual, about one workman being required per six cows for milking, feeding, feed procurement and management. If the present cost/price trends continue, labor costs will need to be reduced or many farms will not be viable. The main opportunity for reducing labor costs is in grazing cattle instead of cutting and chopping pastures and in improving management efficiency and animal production. There is limited scope for farm mechanization on many of the smaller farms.

26. Pasture and Forage Crops. Establishment of pastures using high yielding imported grass and clover species is a relatively new practice in Korea. Suitable methods of establishment and management, the mix and quantity of fertilizers to be applied and suitable seed mixtures are still being researched. Consequently there are no standard recommendations for pasture development on dairy farms. Trials to date indicate that simple mixtures of only one or two grasses with clover are better yielding than multiple mixed pastures. Yields of about 30 mt of dry matter with a 65% utilization rate are being achieved on some of the better dairy farms. Perennial ryegrass suffers severely from summer heat and greater emphasis is now being given to Orchard Grass (Dactylus glomerata) and Tall Fescue. Ladino white clover (Trifolium repens) flourishes successfully under a wide range of conditions, producing good yields and persisting as a closely mown pasture plant. Clover dominance of pasture has frequently occurred after the first summer to such an extent that farmers, fearing cattle bloat, are reluctant to sow clover in new pastures. This dominance however is typical in pasture establishment in many countries and should be expected to decline once soil nitrogen and fertility increases. Nitrogen fertilizer (urea) has been heavily used in Korea with good result but the cost has increased rapidly, thus making clover establishment more financially attractive to farmers. Pasture life is usually 4 to 5 years.

27. Forage cropping systems have been evolved for summer and winter feeding with good results on many farms. The most common crops are maize for silage and ryecorn for winter feed. Costs of production are high due to large labor inputs and heavy application of fertilizers. Yields for ryecorn have been about 20 mt of green matter/ha/year, and for corn about 35 mt of green matter/ha/year. Corn is chopped and stored in simple earth pits lined with plastic. Feeding-out is laborious and wastage, excessive. Many farms also make pasture hay from improved and mature grasses.

E. Supporting Services to Livestock Production

28. Although the Ministry of Agriculture and Fisheries (MAF) is in charge of the overall supervision of livestock production, there are a number of institutions responsible for the provision of services. These institutions are Government agencies, semi-private organizations and special farms established with foreign support. There has been some overlapping in the provision of services to livestock production; nevertheless the extension and quality of some strategic services need considerable strengthening to achieve the goals of livestock development.

The Livestock Production Bureau

29. All aspects of forage, concentrate feed and pasture production, livestock production and health and livestock product and by-product utilization fall within the area of responsibility of the Livestock Bureau of MAF. This Bureau is divided into four operational divisions: Livestock Production, Livestock Feed, Veterinary, and Dairying. There is a small and competent central staff of about 50 professionals and about 280 veterinarians paid by the central government working in the field. Much of the responsibility for animal health control and extension is borne by technicians employed by provincial and country governments.

Research, Demonstration and Extension

30. The Office of Rural Development of MAF is primarily responsible for research and guidance services to all the agricultural sector. Livestock research is of relatively minor importance; financial and staff allocations of ORD are mainly directed to crop production. However, some stations, generally located in the Alpine area and in Cheju Island, have concentrated their activities on livestock development. There is still need for further research of practical problems affecting cattle production in Korea; the tendency at present is to emphasize problems of academic interest.

31. A considerable amount of agricultural research in Korea is supported by foreign capital, though only a small percentage of this is allocated to livestock research. UNDP/FAO projects have financed studies on pastures, forage crops, rangeland development and beef cattle fattening at the village level. Three demonstration farms have been established with foreign financial and technical support. The Korea-German Farm at Anyang was established in 1969 to demonstrate intensive forage feeding techniques. The Korea-New Zealand Dairy Demonstration Farm at Pyongtaek and the Korea-Australia Sheep Demonstration Farm at Unbong have provided applied research and extension facilities in intensive pasture production. Some research and extension activities are also carried out by National Animal Breeding Stations and the Korea Dairy Beef Company under IDA Credit 234-KO, and with bilateral assistance from the Danish and New Zealand Governments.

Livestock Health and Quarantine

32. MAF through the Livestock Production Bureau, Veterinary Division and the ORD is responsible for livestock health services. At the central government level, the Veterinary Division provides for control of meat and milk hygiene, disease control programs, veterinary pharmacy and veterinary administration. At field level there are 11 diagnostic laboratories maintained by ORD. Treatment of animals in rural areas is the responsibility of some 326 private veterinary practitioners who perform routine tests and diagnoses at central government expense. There are about 700 veterinarians practicing in rural areas and about the same number in urban areas.

33. MAF operates National Animal Quarantine Stations at Busan (capacity 900 head) and near Kimpo Airport in Seoul (300 head). Government plans to build a new station in Inchon with a capacity of 300 to handle imports by sea. Most animals are kept in quarantine on arrival in Korea for a period of 15 days.

F. Government Policies and Programs for Livestock Development

34. The present Livestock Development Plan covers the period 1973-1981 and has its main goals: (a) increased meat and milk production to meet domestic demand; (b) development of idle upland; (c) increased exports of livestock products and (d) improved farm incomes. During the next few years, livestock production is expected to increase about 5% per annum, which on past performance seems reasonable. Specific measures which Government has taken to stimulate growth in livestock production include the provision of subsidies for pasture establishment, subsidies on fertilizers and food concentrates, relaxation of foreign exchange controls to permit the importation of cattle, tax concessions and the provision of long term loans at concessionary rates of interest to farmers.

Pasture Development

35. There are substantial untapped land resources which could be profitably developed for cattle production. According to MAF estimates, from 600,000 to 1,000,000 ha of slopeland and forestland is convertible to agricultural use. The amount of this land which would be used for livestock development will depend on opportunity costs for investment in other agricultural enterprises, but estimates based on soil quality and gradient range from 350 to 800,000 ha as being suitable for the establishment of improved pasture. In addition, MAF considers that there are about 700,000 ha of lowland irrigated paddy fields which could be double cropped with hay, silage or green feed.

36. Following enactment of the Grassland Law in 1969, farmers who wish to develop pastures on uncleared forestland must apply for a license from the Bureau of Livestock, MAF. Once authorization has been obtained, farmers

are eligible to receive subsidies and loans for development on condition that the work is completed in one year. Procedures for authorization, however, are detailed and long and are further complicated by the need to obtain approval of the Office of Forestry in the Ministry of Home Affairs if the land to be reclassified is leased from the State. The present scheme for subsidies and loans for pasture establishment is based on an MAF estimate of 247,000 won/ha for land clearing, purchase and application of fertilizer and seeds, improvement of farm access roads, erection of fences and surveying of the development area. Project estimates are 166,000 won/ha for essentially the same result. The amounts allocated by Government are:

Subsidy	99,500 won/ha
Loan	65,500 won/ha

The loan carries an interest rate of 9% and the repayment is over 5 years following 3 years grace. The subsidy is given in cash for land clearing (60,000 won/ha) and in kind for other inputs. To be eligible for these concessions, land to be developed must have a slope less than 30% and the density of forest must be less than 30%. By 1981, Government expects to have about 340,000 ha sown to improved pastures. This objective appears optimistic given that there are now only about 60,000 ha of improved pastures.

Supply of Cattle

37. Government projects that from 1974 to 1981, the national beef herd will increase 550% and the dairy herd 230%.

Table 9: Livestock: Cattle Projections 1973-1981
(thousand head at year's end)

	Korean Cattle	Beef Cattle		Dairy Cattle	
	Total No.	Total	Imports	Total	Imports
1973	1,390	9	4	46	5
1974	1,453	16	5	60	7
1975	1,533	25	5	75	5
1976	1,622	35	5	89	3
1977	1,705	46	5	105	3
1978	1,789	57	5	124	3
1979	1,856	71	5	145	3
1980	,919	86	5	171	3
1981	1,999	105	5	200	3

Source: MAF Livestock Development Plan 1973-1981.

This estimate is based on moderate imports of quality beef and dairy cattle and improvement in the breeding rate from the present levels of 27% for Korean cattle and 48% for dairy cattle to 31% and 54% respectively during the planned period. Again these projections seem optimistic given the present inferior AI services and poor animal husbandry practices.

Capital Supply

38. In addition to financial assistance to farmers for pasture establishment, Government proposes to supply additional credit to farmers at concessionary rates by either direct allocation through NACF, or by inducements to private sources by granting tax exemptions and subsidizing interest rates. Little further has been heard of these credit arrangements since the Livestock Development Plan came into effect in 1973.

Tax Exemptions

39. Government has attempted to promote livestock production by exempting farmers from several taxes. Livestock farmers are exempt from income tax from years 1 to 4 of development and are granted a discount of 50% on income tax over the following 6 years. If a farm is owned by a company, profits are tax exempt for the first 7 years, and for the following three years, taxes are discounted 50%. Property taxes are not applied on land or buildings used for livestock production and if land or buildings are purchased for livestock production the Real Property Acquisition Tax is waived.

40. The investment planned during 1973-1981 to meet the objectives of the Livestock Development Plan is 57,400 million won which represents 0.4% of the total rural investment outlays envisioned for Korea in the same period. Of the 57,400 million, Government expects to contribute 51,331 million won, and private sources the remaining 6,069 million won. Existing programs are to continue on an expanded scale, particular emphasis being given to substitution of imported animal feed grains with pasture and forage crops. About 80,000 ha of pasture improvement are planned and 44,000 beef cattle and 35,000 dairy cattle are to be imported.

REPUBLIC OF KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Dairy Processing and Milk Products Marketing in Korea

A. Dairy Cooperatives and Commercial Companies

1. The operating dairy companies in Korea divide conventiently into:

(a) Small cooperatives and private fluid milk plants

(b) Large cooperative plants

(c) Large commercial plants

(d) Miscellaneous small plants

2. Co-operative and Private Fluid Milk Plants. The present number of small processing facilities in Korea is about 35. Small plants have capacities between 130 and 4,300 mt per annum, most producing about 420 mt per annum on an 8 hour day basis. Most small plants serve populations less than 200,000. The livestock cooperatives are usually capitalized with 150,000 to 400,000 won from associated farmers owning in total from 100 to 400 dairy cows.

3. Milk quality of the small plants is fair, but there is evidence of dilution (specific gravity test). Testing for fat content is usually not practiced and all plants are deficient in proper laboratory facilities. Plants consist of weighing scales for milk cans and a chilled wall tank for cooling and holding. Milk is filtered, homogenized, pasteurized and then passed to a balance tank over a simple bottle filler. Sanitation and milk quality, from farmer to factory door, is supervised by the MAF. The Ministry of Health and Social Welfare arranges for periodic checks at the retail level.

4. Most small cooperative plants produce for grossly undersupplied markets. The estimated demand for fluid milk in an area of the Yeongnam region in 1974 was for 9,000 bottles per day with a 30% per annum growth factor. Availability of fluid milk from the small cooperatives in this region was 3,500 bottles per day. Small cooperatives are benefiting from credit from the NACF to increase production and some local city governments now provide loan finance for importation of heifers to cooperative farmers. Most of these plants will be able to increase milk throughput with modest expenses and improvement in management.

Large Cooperative Plants

5. The four largest specialized dairy cooperatives are Seoul, Kyungnam (Busan), Taegu, and Taejon. The Seoul Co-op is by far the largest milk enterprise in Korea, representing 57% of the whole industry. It receives 160 mt per day of milk (1974) from about 25,000 cows and has about 200 farmer members. Present facilities for fluid milk (bottles, plastic sachets) and milk powders (baby, whole, skim) are fully stretched to 20 hours per day. The Co-op also has an evaporated milk plant and a small butter plant. With the aid of a German loan and technical assistance, it is presently constructing a new facility (Seoul II) which will be completed in 1976 and will double existing capacity. Standards of control and quality are better than the small cooperatives but considerably below the private companies.

6. The Kyungnam Company (Busan) has facilities for both bottled and sachet packed milk, and for milk powders. Kyungnam has usually been able to pay their suppliers the highest milk price in Korea because of its economies of scale, but it has not been able to expand operations due to its heavy debt burden. The present supply area of the Kyungnam Co-op plans to import cattle in 1975, utilizing NACF finance.

Large Commercial Plants

7. Namyang. The Namyang Company is situated near Cheonan and began operations in 1967. The Company specializes in a good quality baby milk powder which has captured 75% of the Korean market. Other products are evaporated milk and sterilized milk. Its capacity for the latter is about 36,000 packs per day, about one-quarter of KDBC's present production. Namyang is presently operating three shifts and plans to double its drying capacity in 1976.

8. Daeyle. This Company was established in 1973 by private purchase of a bankrupt company previously financed by a USAID loan. Daeyle has a technical service agreement with Foremost (U.S.A.) and markets its products under the Foremost brand name. Ice cream is the primary product, but Daeyle also produces milk in plastic sachets for the Seoul market. The company is noted for its aggressive market approach and has expanded its capacity in 1974 to a milk intake of about 25 mt per day.

9. Hai-Tai Confectionary Company has been making confectionary goods since 1945. It is now a public company with 4000 shareholders and has subscribed capital of US$10 million. Technical service for milk processing is provided by Meadow Gold (USA). Hai-Tai now concentrates on ice cream while maintaining some fluid milk sales. A new ice cream plant (capacity about 5 mt per hour) is under construction in addition to its plant near Seoul. Hai-Tai also has a small ice cream plant on Cheju Island (with a capacity of 1 mt per hour). Hai-Tai will be the largest ice cream producer in Korea if it sustains its current expansion program.

10. KDBC. Project II would expand dairy processing for KDBC and continue the Company's technical assistance to farmers. KDBC is the only Korean dairy processor with full capability in farm management to develop new farm areas and integrate these with milk processing. KDBC is regarded as a semi-private company, since there is 40% ownership by Government. The present wishes of Government are to provide healthy competition with quality milk products in an expanding market. KDBC is viewed as an excellent channel for Bank financing as the Company has the capability with consolidation, and consequent increases in milk flow, to improve processing economy in existing areas and develop new dairy farming and processing centers.

(a) Honam Plant

KDBC has installed three tetrapak machines with a packing capacity which about matches the present sterilizing capacity of 4000 liters per hour. In addition to expansion of tetrapack milk production, an evaporator has been included in the Project to allow for production of evaporated and condensed milk in bulk containers for storage and transport to other users or plants. Evaporation provides an emergency outlet for milk in case of short-term problems, such as late arrival of packaging materials. To overcome the collection problems in the Honam area, the construction of a milk collection center with a tankered milk delivery system and some small local can accumulation or cooling depots is proposed.

(b) Central Plant

The facility at Jinui is a technically sophisticated plant to produce baby milk powder and other powders. Plant capacity is adequate to the early 1980's. Ongoing developments include a plant for hydrolysing casein, which will replace the use of imported protein hydrolysate, and will result in a reformulation of the baby powder for greater economy. With the proposed drying expansion at the plant of powdered coffee creamer and continued drying for whole milk powder, milk drying capacity will be doubled to about 80 mt per day. To achieve this capacity, it will be necessary to increase the hours of milk reception and provide milk-chilling in small farm cooling centers and provide for tanker supply from the proposed collection center.

Miscellaneous Small Plants

11. Four small private plants operate in Korea, all with small evaporated milk facilities and in several cases, facilities to process fluid milk. The

small facilities provide a useful function in receiving surplus milk as it arises in some localities. The Yakult Company, formed in 1971 near Seoul is the largest of the small plants and produces a milk based acid beverage (called Yakult) in blow molded 65 cc plastic bottles. Milk supplies are obtained from Seoul Co-op up to 10,000 l per day. Yakult is a Japanese product enjoying a rapid expansion. In addition to these processors, there are a number of small ice cream plants, most of which are out of operation due to the lack of sufficient milk powders. Since these plants were largely operating on "aid" milk powders, statistics are lacking.

B. National Milk Production and Consumption

12. Domestic production of raw milk has been increasing rapidly and fairly steadily since the early 1960's. With the exception of 1967, 1970, and 1971 when Korea imported substantial amounts of milk powders, production has increased faster than 30% per annum. Prior to 1972, gift milk powder imports distorted the non-aid consumption pattern since some 30% of "aid" powders found their way into bakeries and ice cream plants. Diversion into other channels apparently led to an oversupply situation in 1972 and consequent suspension of "aid" powder imports. In turn, the embargo has led to a significant reduction in availability of ice cream and utilization of milk powders in bakeries.

13. Table 1 of this annex presents past and projected production figures for total raw milk equivalent production. These 1974 to 1981 projections provide for the minimum growth rate in milk availability of 18% per annum after 1976. Projections are to be achieved by the importation of cows including those in the proposed Project II, and by the rate of natural increase in the national herd. Milk availability in 1975, projected in Table 1 at 179,000 mt, is likely to be exceeded by as much as 12%. A minimum growth rate of 20% is likely, given previous growth rates and the suppressed demand for milk powders and the rapid growth in the ice cream market. Even the most pessimistic market growth rate assessments are well above 10%.

14. In 1973 fluid milk accounted for 55% of the supply, baby foods for 31%, and ice cream, directly from milk and via whole milk and skim milk powders, about 3 to 5%. Other powders and evaporated milk made up the balance, in about equal proportions. Butter (ghie) is not included in these calculations as it is a by-product of skim milk powder and fat standardized milk powders under Korean conditions. The major change expected in the next few years is for continuing rapid growth of the ice cream market at the expense of fluid milk and baby powder milk, which are expected to expand at a minimum of about 15% and 12% respectively. By 1981, fluid milk may comprise 50% of the supply, baby milk powder about 19%, and ice cream 20% or more, of which the direct milk use in ice cream will be about 9%. Evaporated milk production will probably stagnate and miscellaneous products such as cheese

and yoghurts, coffee creamers, etc. will approximate 2% of the raw milk. The estimated consumption pattern of milk products is contained in Table 2 of this annex.

15. The effect on national processing requirements will be for a steady expansion of fluid milk plants, including some for a premium product in a high quality non-returnable container such as tetrapacks, and a rapid expansion of ice cream production. The predominant need will be for a substantial expansion of milk drying facilities to provide for expected increases in baby food needs. Equally important, by 1981 whole milk and other powders will be needed to balance the seasonal supply-demand variation and provide extra milk solids necessary in ice cream.

16. By 1979 when all current and firmly-planned plants will be operating beyond 16 hours per day capacities more drying plants will be needed. The development of further drying facilities, preferably in a new area without a large local milk demand, is of national importance. KDBC may wish to develop investment plans for drying facilities in the Iri region in 1978-79 to satisfy some of the milk drying needs. Present drying capacity in Korea and required levels for drying powders are contained in Table 3 of this annex.

C. Regional Market Requirements

17. Demand growth rate is expected to differ significantly between regions. The Seoul area with its well-developed market supply, should experience a demand growth of about 16% per year. Per-head consumption for 1976 is estimated to be 13 kg of raw milk equivalent. The area of highest demand growth is Yeongnam, a high income, but undersupplied market. The annual demand increase in this area can be expected to be about 30% to the early 1980's, while estimated milk consumption per head of 7 kg raw milk equivalent is projected for 1976. Demand development for other regions will be at intermediate rates. Rural areas will consume about 3.5 kg per head per annum in raw milk equivalents. A major goal of the proposed project is to fill a part of the need to develop facilities in the Yeongnam-Busan area. No significant ice cream plant exists in this region and there is a present shortage of all milk supplies.

Prices and Government Prices Policy

18. The cost of raw milk is a major determinant of the processor's price. The cost of milk and milk products in Korea are higher than in most other countries. At the factory door, raw milk in Korea is 120 won per liter or US$0.25 as compared with US$0.18 in England or US$0.19 in Denmark. The contribution of raw milk prices in the processed milk price has gone from 68% in 1968 to 75% in 1975. Product prices are consequently not low. KDBC fluid milk retails for US$0.60 per liter whereas the cost to the consumer in Denmark is US$0.38 and in England US$0.31. Fluid milk in Korea is not likely to become a significant part of the general diet. Korean milk products are

consumed largely by middle to high income groups. There is no indication that high product prices are a constraint to the present high demand or market size.

19. Government sets prices for milk at the farm gate and guides maximum prices for fluid milk in bottles. Prices for ex-factory baby milk powder and the consumer price for the product are established by Government. Prices for other dairy products must have the approval of the MAF in consultation with EPB. Prices for both flavored milks and prepack and tetrapack fluid milk come under the same Government review process. No controls on other milk powders or ice cream are exercised by Government.

20. The most important price setting mechanism is that for milk at the farm gate. Under the 1968 Dairy Development Law, an advisory body was established to make price recommendations to MAF and EPB. The body comprises seven Government administration officers including the Vice Minister of MAF, the Director of the Livestock Bureau, EPB and livestock research officials; three representatives of milk processors; three farmer representatives; and three University representatives. Bottled milk processing and selling margins are based on Seoul Co-op's cost structures. Government allows about 10% higher prices for the products of private processors excluding fluid milk in bottles and baby powder milk. The 10% margin to private processors compensates for tax advantages to cooperatives. The product price control system has been maintained continuously, although baby milk powder was uncontrolled for a few weeks in 1974 prior to devaluation. Minimum prices for milk at the farm gate are rarely updated as the price of milk paid to farmers has usually been increased through competition for milk supplies by processors.

21. Average selling prices for fluid milk and baby powder milk are shown in Table 4. In comparison with the price of raw milk, the processor's margin has tended to increase from about 20% in 1967 to 38% in 1972-73. Following stricter controls, this margin was reduced as low as 27% in a period of 3 months in late 1974. The current relationship of the farm price to guide price for fluid milk shows a margin of 34.5%. Over time, it is clear that Government has sought a fair degree of stability on prices for equilibrium between farmers and processors. Government recognizes and assures the profitability of both parties in this dynamic cost-price relationship. The margin for processors must be over 32% to assure a reasonable degree of profitability.

22. The current equilibrium milk price is close to the actual price paid to farmers. Based on historic input costs and price margins, the equilibrium price is about 117 won per liter. Farmers are currently paid 120 won per liter. The equilibrium margin for processors at this price should be about 36%. It is likely that Government will maintain the equilibrium between farmers and processors based on the past margins which average from 34% to 36%. All calculations of benefits for farmers and processors from the proposed Project were projected at present prices since they approximate an equilibrium in the primary cost/price relationship for the Project.

KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Table 1

Milk Availability and Projected Supply - 1969-1985
(Imports in Raw Milk Equivalent, Selected Years)

Year	Imports	Production	Total Supply
	----------000 m tons----------		
1960	30.5	0.5	31.0
1962	92.0	2.6	94.6
1964	70.3	7.1	77.4
/a			
1966	52.8	14.6	67.4
1967	171.5	19.2	190.7
1968	95.0	24.4	119.4
1969	117.6	35.5	153.1
1970	72.2	51.9	124.1
1971	162.9	65.3	228.2
1972 /b	72.9	79.8	152.7
1973 /c	-	104.1	104.1
1974	-	139.0	139.0
1975	-	179.0	179.0
1976	-	215.0	215.0
1978	-	299.0	299.0
1980	-	417.0	417.0
1981	-	491.0	491.0
1985 /d	-	859.0	859.0

/a Commercial imports virtually ceased in 1965. Prior to this some 95% of imports were gifts.
/b Gift imports suspended mid-1972. These represented about 98% of total imports 1965-1972.
/c About 98% of production will be processed from 1973 on (MAF data).
/d Extrapolated at 15% p.a. 1981-1985.

Source: MAF data to 1980 IBRD 1980-1985

KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Table 2

Estimated Consumption Pattern of Milk Products in Korea - Present and Future

(In raw milk equivalents)

	1973 %	1976 %	1981 %	1985 %
Fluid Milk	55	55	50	50
Baby Milk Powders	31	24	19	17
Evaporated Milks	4	2	1	1
Ice Cream (Direct Milk Use)	2	6	9	9
Whole Milk Powders /a	6	11	18	18
Skim Milk Powders /b	1	1	1	3
Others	1	1	2	2
Total Milk Powders /c	38	36	38	38
Total Milk MT /d	102,000	210,000	481,000	842,000

/a Availability less losses, self-consumed etc. 0.2%
/b Some 50 to 70% of this would be used in ice cream - some such powder could be substituted by sweetened condensed or evaporated milks.
/c The ratio of skim to wholemilk powders will vary depending on ice cream formulations used, bakery needs etc.
/d In terms of plant capacity required; one standard milk powder may be substantially substituted for another.

Source: 1973 figures ex MAF data
1976 and later: Mission projections

KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Table 3

National Processing Plant Capacity Needed
Drying Capacity - Raw Milk Equivalents
(metric tons)

	Seoul I	Seoul II	Namyang	Hai-Tai	KDBC	Pusan	Totals
Per hr.	6	10	2	2	4.5	2	26.5
Current 8-hr. day basis Yearly (Mission data)	117,520		5,840	5,840	13,140	5,840	48.180
Actual 16 hr./day	35,040		11,680	11,680	26,280	11,680 /a	96,360
Proposed 8 hr/day basis Additions		29,000	11,680	11,680	.		52,560
Totals by 1977-78 (8 hr.)	(17,520)	29,200	11,680	11,680	13,140	5,840	71,540 /b
Max 1977-78 (16 hr.)	17,520	58,540	23,360	23,360	26,280	11,680	160,600 /c

OVERALL DRYING CAPACITY REQUIREMENTS

Year	Drying Capacity Required (RME)	Drying Capacity Available (RME)
1973	38,760	35,040
1976	75,600	76,380
1981	182,780	89,000
1985	320,000	160,600

/a plants need some "debottlenecking" expenditures.
/b without Seoul I
/c with Seoul I at 8 hrs/day only - decrepit plant.

KOREA

SECOND INTEGRATED DARIY DEVELOPMENT PROJECT

Table 4: Milk Prices

Year	Raw Milk Price Farm Gate won/l	Wholesale ex Factory Price 180 cc bottles won/bottle	Wholesale ex Factory Price 180 cc bottles won/l	Margin won	Margin Wholesale %	Ex Factory Baby Milk Powder 450g can (won/can) Seoul	Ex Factory Baby Milk Powder 450g can (won/can) Namyang
1964	27.7	-	-	-	-	-	-
1965	34	-	-	-	-	-	-
1966	37						
1967	43	10.71	59.5	16.5	27.7	252	442
1968	50	12.29	68.3	18.3	26.8	280	409
1969	50	13.20	73.3	23.3	31.8	300	407
1970	55	14.91	82.8	27.8	33.6	308	409
1971	60	16.40	91.1	31.1	34.1	328	403
1972	65	18.81	104.5	39.5	37.8	358	415
To June 1973/1	67.5	19.66	109.2	41.7	38.2	360	429
From July 1973	75	20.22	112.3	37.3	33.2	402	437
From Jan. 1974	75	20 /2	111.1	36.1	32.5	-	-
From Mar. 1974	90	23	127.8	37.8	29.6	-	-
From June 1974	90	27	150.0	60.0	40.0	440	490/3
From Aug. 1974	100	27	150.0	50.0	33.3	440	490
From Oct. 1974	110	27	150.0	40.0	26.6	440	490
From Mar. 1975	120	33	183.3	63.3	34.5	540	600

/1 Seoul Co-op raw milk prices prior to 1973; Government minimum thereafter.

/2 Actual average prices prior to 1974 guide prices thereafter as statistics lacking. Sachet packs selling about 30-35 won/180 ml, tetrapacks about 45 won/180 ml and 50 won/200 ml (KDBC).

/3 KDBC 670 won/500 g (equivalent to 600 won/450 g).

Source: Price Data - MAF to end 1973. Mission enquiry thereafter.

REPUBLIC OF KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

The Korea Dairy Beef Company and Dairy Development Project I

1. The Korea Dairy Beef Company Limited (KDBC) was established in February 1969 as a subsidiary of the Agriculture and Fishery Development Corporation (AFDC) with an authorized share capital of 20 million won. The purpose of the company as stated in the articles of incorporation is to undertake dairy farming and the processing of livestock products, and to provide financial and technical assistance to farmers in order to increase farmers' incomes.

2. Fully authorized and paid-in share capital now totals 600 million won of which AFDC holds about 40% with the balance held by 13 individuals. Mr. Bok Yong Kim, the President of KDBC, is the largest shareholder holding with a daughter about 40% of total share capital; other private shareholders are not related to Mr. Kim.

3. The Board of Management of KDBC includes the President, Vice President, Managing Director, 3 Department Directors, 2 nominees from AFDC and 4 Directors elected at the annual general meeting of shareholders. The organization of KDBC is shown in Chart I. Present total staff now number 315. Staff and future job requirements are shown in Table 1.

The Integrated Dairy Beef Development Project (Credit 234-KO)

4. On February 11, 1972, KDBC became the borrower and executing agency for the IDA-financed Integrated Dairy Beef Development Project. Following the IDA appraisal, KDBC was formally organized to provide technical services and credit for farm development, to import and distribute project cattle, appraise and supervise all sub-loans and purchases, and process milk produced by project farmers. Specifically, the Project aimed at establishing and developing 600 small dairy farms (5 to 15 ha), about 100 medium size units (15 to 30 ha) in the Central and Honam Districts, and two facilities for processing and marketing milk from Project farms. The total cost of the project was estimated at US$12.6 million. An IDA credit of US$7 million was intended to meet all foreign exchange costs and US$1 million of local currency expenditures.

5. Credit and inputs provided through the Project were to be accompanied by adequate technical planning and supervision of farm development. In farm development and in the demonstration work carried out on the Korea-New Zealand Demonstration Farm, emphasis was to be placed on maximizing use of locally produced pasture for milk production in contrast to the established system which depended heavily on concentrate feeds of which

a large and increasing percentage was imported. Development of project dairy farms was to be associated with the use of subsidies for pasture establishment in selected areas.

Financing of Dairy Farms

6. By December 1974 KDBC had selected for financing 582 farms in the Central district (Gyeong Gi and Chung Nam provinces) and Honam (Jeon Nam province). The distribution is as follows:

	Number of Farms Selected for Financing			
District	1972	1973	1974	Total
Central	121	116	98	335
Honam	88	62	97	247
	209	178	195	582

The number of cattle imported and distributed to farmers is given by district below. At full disbursement a total of 4,940 cattle will have been distributed to farmers, the last 74 to be imported in July 1975.

Cattle Importation and Distribution

		Number Distributed		
Year	No. of Cattle Imported	Central District	Honam District	Total
1972: A[/a]	850	450	40	850
B	850	566	284	850
1973: C	1,024	638	386	1,024
D	750	448	302	750
1974: E	1,425	681	711	1,392[/b]
TOTAL	4,899	2,783	2,083	4,866

/a A & C: Imported from U.S.A.
B & D: Imported from Australia.
E : Imported from New Zealand.

/b 33 head died or were culled before distribution.

7. At December 1974, 22 farms had ceased dairying since commencement of the project. Most of these farmers stopped dairying for reasons such as family circumstances, change of residence or off-farm occupation, or on the advice of KDBC. In a few cases debt foreclosure was resorted to by court action to recover overdue debts or assets endangered due to poor husbandry or illegal cattle sales; three of these were settled out of court. Due to the rising cattle values from 1972 to 1974 most of the debts of the 22 farms were recovered in the sale or transfer of cattle to other (mainly KDBC) farmers.

Distribution of Farms which ceased Dairying

District	1972	1973	1974	Total
Central	-	5	4	9
Honam	-	5	8	13
Total		10	12	22

8. KDBC disbursed IDA and Government funds for both short and long term loans for farmers. Both types of loans are advanced at 9%. Short term loans were repayable within one year and long term loans are repayable in 9 years including 3 years grace during which interest is paid. IDA provided 100% of foreign expenditures for importation of cattle and semen, and 45% of the dairy farm develpment costs (land clearing, pasture improvement and erection of fences, etc). Loans for the purchase of cattle advanced upto 80% of the cost of the cattle; the remaining 20% being paid by farmers. For the purchase of machinery and construction of buildings, a loan of 70% of the cost was available to farmers. The magnitude of these loans and their use is summarized as follows:

Size and Use of Farm Loans 1972-1974

	Per Farm	Per Heifer Distributed	Percent of Loan for: Farm Develop.	Cattle Supply
	Thousand Won (US$)			
Central	3,158 (7,895)	377.9 (945)	35	65
Honam	3,205 (8,012)	383 (957)	34	66
All Farms	3,178 (7,945)	380.1 (950)	35	65

9. Farmers were selected by KDBC field technicians from lists supplied by county officials in localities designated dairy development by

national and provincial governments. The main criteria for selection were that the farm be larger than 5 ha, be within reasonable access for milk collection, have suitable soils and topography for pasture and forage crop production, and that farmers be able to secure collateral of 160% of the estimated loan. KDBC field technicians prepared farm development plans for each farmer selected, and then loan documents based on the amount the farmer was prepared to invest from his own resources and the amount of assets and liabilities he had. These loan applications were approved at KDBC head offfice and were usually supported by two guarantors. Loans were granted on the condition that farmers enter an agreement to sell their milk to KDBC. Most loans were received by real estate mortgage registered with a public notary. Cattle were required to be insured either with KDBC or NACF. The same procedures would be followed in Project II.

10. A summary of KDBC farm records is given below. Nearly all the farms in the Farm Management Recording System were established from 1972 to 1973 and refer to the production year January 1 to December 31. There is considerable scope for improvement in the quantity and quality of information recorded in the system and in the analysis of this data. The new Zealand Government under its technical assistance program to Korea agreed in May 1975 to provide an agricultural economist/farm analyst for two years to assist KDBC improve their farm recording system and search new ways to improve the efficiency of present and future farms.

Summary KDBC farm records 1973 and 1974

		1973	1974
1.	No. of farms recorded	181	346
2.	No. of cattle/farm	12.8	17.6
3.	No. of milking cows/farm	6.7	8.2
4.	No. calvings or lactations/farm	4.7	7.1
5.	Milk/day/all cows (kg)	9.7	11.2
6.	No. days in lactation	307	307
7.	Gross milk income/farm '000 won	1,624	3,184
	Other gross income/farm '000 won	245	151
	TOTAL gross income/farm '000	1,869	3,335
8.	Gross milk income/cow '000 won	232	331
9.	Av. raw milk price/kg	74	102
10.	Feed concentrate cost/head '000 won	60	78
	Feed cost as % gross income	43	41
11.	Cattle per labor unit	5.0	6.7
12.	Fertilizer cost/ha '000 won	11.2	12.5
13.	Deaths as % of total cattle	3.1	4.7
14.	Abortions as % of adult females	2.0	3.0

Integration of Dairy Farm Development with Dairy Processing Facilities

11. Most of the technical and financial problems encountered in Credit 234-KO have been the result of inappropriate timing and phasing between on-farm development and the construction of plant facilities, the reverse location of plant facilities from that which was originally planned, and cost over-runs from implementing different technologies in the processing facilities. In 1972, 850 non-mated heifers from the US were imported by KDBC, but in the same year, KDBC also imported an equal number of pregnant heifers from Australia. The appraisal estimates were for the importation of 5,100 non-mated heifers. However, IDA agreed in 1972 to the importation of pregnant heifers to accommodate the strong demand by Korean

farmers for cows which were close to milking. The decision for mated heifers was also taken to reduce the farm cost of feed grains for the period originally envisioned to bring imported heifers to pregnancy. In 1973, an additional 1,700 pregnant heifers were imported from USA and Australia. The shift to importation of pregnant heifers led to an 80% increase in the cost of cattle imports above project estimates. This necessitated a reallocation of funds and an additional allocation of US$1.1 million to the cattle subcomponent. The shift to pregnant heifers, however, had the much more important effect that milk flowed from Project farms before processing plants were ready to receive that milk. By May 1973, 400 of the proposed 700 Korean farmers were participating in the Project without an outlet for this milk. Consequently KDBC was forced to assume the collection costs of the raw milk and sell it to other processors at no profit.

12. Several factors account for the entire revision of the plans for processing plants made at the time of Project appraisal. Given the early milk flows, KDBC was forced to move ahead rapidly with plant construction. The decision was made to construct a fluid milk plant at Gwangju than risk heavy competition for bottled milk in the Seoul area, which was the original plan. Also, by 1970/71 liquid milk sales were increasing by 29% per annum, whereas milk powder sales were up 38% per annum. This picture, coupled with the realization that national milk drying capacity was severely limited, led KDBC to choose in 1972 the establishment of a milk drying plant in the northern area where most of their milk was produced.

Plant Investments

13. In addition to revisions in plant locations KDBC selected high quality milk production lines, production of a complex baby milk powder and an asceptically packed fluid milk, both having higher cost estimates and demanding greater technology, design, and supervision than planned for in the appraisal. KDBC signed a technical service contract with Morinaga Dry Milk Company of Japan under which Morinaga provided the expertise and greater part of all imported machinery for the production of a high quality baby milk powder. The resulting baby food of higher quality than KDBC's leading competitor (same price) is produced at much higher overhead costs than estimated. The resultant investment cost overruns on the plant were 87%, an additional US$1.2 million.

14. Similarly, KDBC chose a high quality fluid milk line, the production of an asceptically packed milk from the Tetrapack Company of Sweden. KDBC estimated that the sterilized milk product, having a longer life than pasturized fluid milk, would be saleable over a much greater area. Total cost of this plant is under forecast by 31%, but the lower cost has been the result of failure to meet original investment plans which had included the production of flavored milks and ice cream at the same site (see para 16). The tetrapack product demands high cost production with a high percentage of foreign exchange cost in the value added. Imported papers comprise 28% of total input costs.

15. KDBC has had to pay high indirect costs in its association with both Morinaga and Tetrapack Companies. The initial royalty for Morinaga amounted to US$55,000 with additional payments of US$137,000 each year until 1978. The lease on Tetrapack machinery amounts to US$87,000 each year and the initial royalty (leasehold) was US$217,000. In part, however, cost over-runs are due to price increases for imported machinery well above the 10% forecast in the appraisal report. The actual price rises on imported equipment during 1971-1974 were approximately 15-20% per annum.

16. More important, cost over-runs have made it impossible for KDBC to continue their original investment plants. Project I plans for production of whole flavored milks in year 2 and ice cream in year 3 of the Project were suspended. The small butter plant to process the off-take from fat standardizing and a small batch condensed milk plant at Honam have also been dropped. The net effect of these changes in plans, particularly those regarding flavored milks and ice cream, has been to seriously reduce the profitability of KDBC.

Sales

17. The sales of baby milk powder in the eleven months (May 74 - April 75) of production have been satisfactory at 411,000 kg. Sales for this period should have exceeded 700,000 kg, but technical difficulties in start-up operations, and the introduction of the product without sufficient promotion accounted for the reduced amount. The value of sales for this period on baby milk powder has been about 489 million won. It is estimated that the inappropriate phasing of both plants with Project milk resulted in the loss in sales of 400 million won (US$833,000) in 1973. Until December 16, 1974 KDBC was required under Government price controls to sell the powder at 550 won per 500 g/can. The low profitability would improve, now that Government has permitted a 22% increase of the price. The ratio of sales to stocks has improved from 65:35 to 72:28 in the last four months.

18. KDBC began production of tetrapacked milk in December 1973. Milk quality control has been excellent and plant efficiency has been good. An effective agent distribution system was rapidly established, but without prior market research and advertising, sales were disastrous and averaged only 48,000 kg in the first months. By March of 1974 sales had reached 178,000 kg per month and in March 1975 were 490,000 kg (market value of 123 million won per month). Inventories of finished products vary seasonally, but KDBC has dramatically reduced stocks with better coordination between production and marketing. Tetrapack sales now cover all operating costs of the plant, but have been inadequate to generate working capital requirements for both plants or cover KDBC overheads and a much needed promotional campaign. KDBC is expected to generate a greater net surplus in the 1975 summer season from the sales of Tetrapacks (now in 500 cc brick packs) and from the excellent sales of whole milk powder of about 30,000 kg per month. It is estimated that KDBC could sell twice the current amount of fluid milk presently sold given greater availability of raw milk.

Present Financial Condition of KDBC

19. The net operating deficit of KDBC for 1974 is 141.1 million won. This is a result of high administrative and overhead costs in relation to low plant throughput and sales. KDBC should have a net profit at the end of 1976 of about 488 million won (Table 5). KDBC has incurred to date 6 years of loss after all deductions, a loss carried forward of about 84.3 million won. The expected profitability by 1976 will have a combined carry forward value of 301 million won and will ease the company's reliance on costly short-term borrowings for working capital.

20. Balance sheet analysis for 1974 shows the low ratio of accounts receivable to current liabilities, of 22%. When long term liabilities due in one year are included in this ratio, KDBC shows an insufficient degree of solvency. Current liabilities of short-term loans and overdrafts were 358 million won for 1974. As of April 1975, KDBC had short-term loan liabilities of 495 million won (US$1.03 million). 385 million won of these borrowings have come from the Cho Houng Bank at commercial credit and overdraft interest rates of 15.5% and 17.5% respectively. Increased short-term debt service for 1975 will amount to over US$150,000.

Financial Projections for KDBC

21. Given the lack of coordination between plant construction and raw milk flow and the slow start in operations, 1974-75 has been an inevitable low point in financial condition for KDBC. Nevertheless, the company has a sufficient degree of credit worthiness to justify the implementation of the proposed Project. The ratio of net earnings to sales (excluding depreciation) for 1976 should be about 7% and will rise to 9% by 1980.

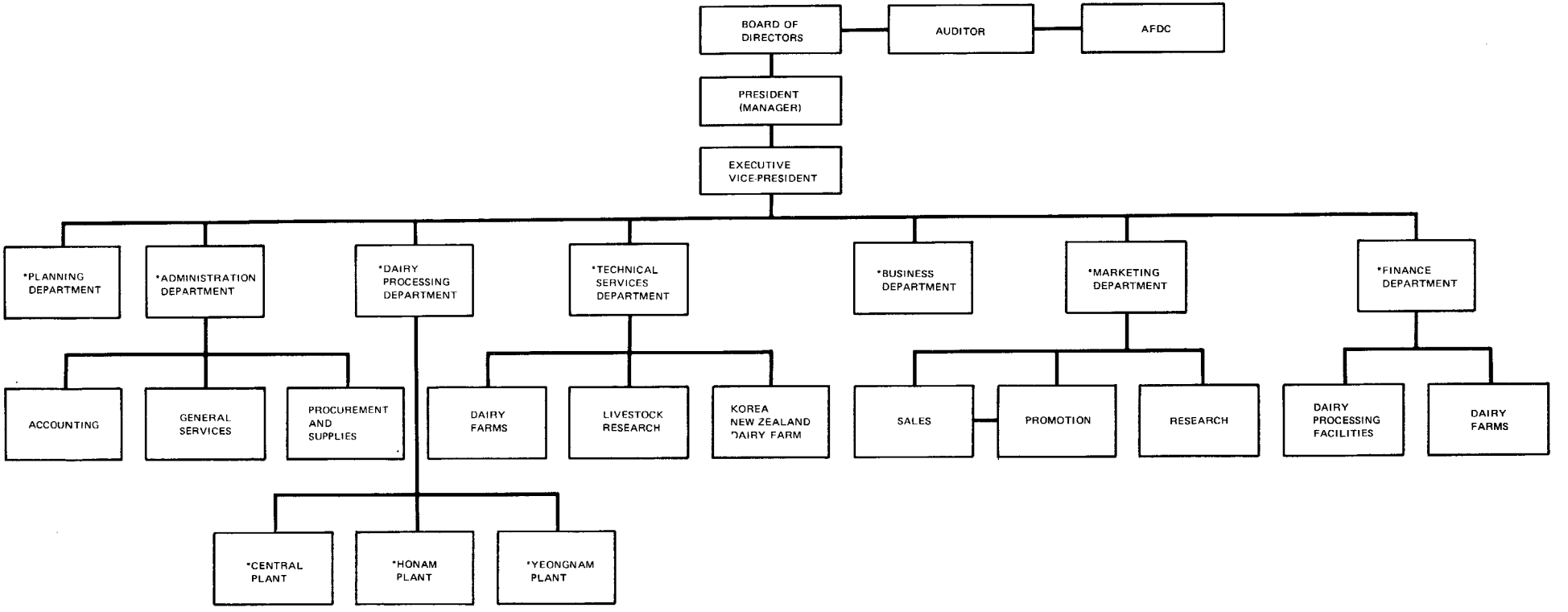
22. The addition of Project II and its diversification in profitable production lines would triple KDBC's profitability by 1980 over projections for that year of Project I. KDBC's present concern for long-term financial viability is the likelihood of increases in long-term debt resulting from devaluation of the won. Including a sufficient degree of risk by calculating losses of 3% increase per year on foreign exchange for both Project I and projected Project II debt payments, KDBC would have no difficulty in meeting debt-service requirements. Net profits of the company at present levels of profitability on frozen milk products, proposed powders, and fluid milk would be 1.0 billion won in 1978, 2.8 billion won by 1982, and 3.2 billion won at full development in 1987.

The Outlook for Project II

23. KDBC has gained an excellent capability from experience in Project I to implement Project II. KDBC staff have developed considerable experience

in planning for on-farm development and coordinating milk flows with processing requirements and seasonal demand. The company has greatly improved processing economy while promoting quality milk products. In the short time of operation, KDBC has demonstrated its strength in technical and quality control aspects of processing and in engineering and execution. With the consolidation of KDBC capabilities in technical assistance to project farmers and in product marketing and distribution, KDBC will be an excellent conduit for dairy farm development and a successful agent for growth in national dairy products.

KOREA
SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT
Organization Chart for Korea Dairy Beef Co.



*Manager of Department or Processing Plant is a representative on the Board of Directors

World Bank–9825

KOREA

ANNEX 3
Table 1

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Korea Dairy Beef Company

Personnel Status KDBC
and Incremental Staff Requirement

Home Office	Present Staff	Additional Staff Required
Managers	5	-
Planning Department		
Planning	3	1
Publishing	2	-
Administration Dept.		
Administration	5	-
Personnel	2	-
Accounting	14	2
Drivers	6	-
Technical Service Dept.		
Specialists	5	4
Marketing		
Supervisor	-	1
Liquid Milk	2	-
Infant Powder	2	-
Accounting	4	2
Sales Promotion	36	6
Drivers	3	-
Ice Cream	-	2
Business Department		
Business	3	1
Purchase	2	1
Finance		
Financing	5	4
Mutual Insurance	1	-
Milk Processing	1	2
Korea-New Zealand Farm	15	-
TOTAL BY CATEGORY	116	26

Central Plant/1	Present Staff	Additional Staff Required
Manager	1	-
Administration	16	2
Production	16	3
Maintenance	23	2
Quality Control	4	1
Material	6	1
Technical Service	8	3
Drivers	11	2
Daily Hired Workers	37	5
	122	19

Honam Plant	Present Staff	Additional Staff Required
Administration	8	1
Technical Service	6	3
Production	22	3
Marketing	7	1
Financing	3	1
Driver	9	2
Daily Hired Workers	22	3
	77	14

Yeongnam Plant	Staff Required
Manager	1
Administration	5
Production	30
Technical Service	7
Marketing	4
Finance	4
Drivers	9
Daily Hired Workers	30
	90

Two Collection Centers	Staff Required
Milk Tester	2
Operator	2
Helper	2
	6

KDBC TOTAL STAFF - 315

ADDITIONAL STAFF REQUIRED - 155

/1 Finance and Marketing employees for Central Plant are attatched to Home Office, KDBC, Seoul.

KOREA

FIRST INTEGRATED DAIRY DEVELOPMENT PROJECT

Financial Projection for KDBC Project Account
(million won)

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
										(constant 1975 prices)							
CASH INFLOW																	
Dairy Processing																	
Sales - Honam Plant	----	----	----	1,287	1,880	1,946	2,139	2,347	2,566	2,808	3,075	3,075	3,075	3,075	3,075	3,075	3,075
Sales - Central Plant	----	----	----	882	3,359	4,344	4,609	5,302	6,083	6,689	7,361	7,361	7,361	7,361	7,361	7,361	7,361
Sub-Total	----	----	----	2,169	5,239	6,290	6,748	7,649	8,649	9,497	10,436	10,436	10,436	10,436	10,436	10,436	10,436
CASH OUTFLOW																	
Dairy Processing																	
Operating Expenses - Honam Plant	----	----	----	1,087	1,606	1,659	1,808	1,981	2,157	2,352	2,573	2,573	2,573	2,573	2,573	2,573	2,573
Operating Expenses - Central Plant	----	----	----	921	2,804	3,486	3,685	4,212	4,707	5,227	5,712	5,712	5,730	5,730	5,730	5,730	5,730
Overheads and Home Office Expenses allocated to Plants	----	----	21	308	419	461	489	533	571	616	666	664	663	663	663	663	663
Sub-Total	----	----	21	2,316	4,829	5,606	5,982	6,726	7,435	8,195	8,951	8,949	8,966	8,966	8,966	8,966	8,966
OPERATING SURPLUS (DEFICIT)	----	----	(21)	(147)	410	684	766	923	1,214	1,302	1,485	1,487	1,470	1,470	1,470	1,470	1,470
1/									(Current Prices)								
Operating Surplus (Deficit)	----	----	(21)	(147)	410	738	896	1,163	1,651	1,914	2,182	2,185	2,161	2,161	2,161	2,161	2,161
2/																	
CASH INFLOW																	
Loans																	
IDA Credit - Technical Services	----	26	18	20	25	----	----	----	----	----	----	----	----	----	----	----	----
IDA Credit - Farm Development	----	500	711	586	40	----	----	----	----	----	----	----	----	----	----	----	----
IDA Credit - Processing	----	139	352	271	146	----	----	----	----	----	----	----	----	----	----	----	----
Government Loan - Farms	60	251	159	23	----	----	----	----	----	----	----	----	----	----	----	----	----
Short-term Loans	15	----	----	358	----	----	----	----	----	----	----	----	----	----	----	----	----
Farm On-Lending																	
Interest Revenue on IDA Funds (9%)	----	45	109	162	158	140	113	85	57	30	10	----	----	----	----	----	----
Interest Revenue on Government Funds (9%)	5	28	42	43	39	32	24	17	9	3	----	----	----	----	----	----	----
Animal Insurance	----	----	----	34	44	46	50	53	57	61	66	71	76	83	88	91	95
Collections from Farms 3/	----	----	----	10	135	281	383	390	390	380	255	109	7	----	----	----	----
Government Subsidy	----	9	10	9	12	----	----	----	----	----	----	----	----	----	----	----	----
Paid-in Capital	330	30	40	200	----	----	----	----	----	----	----	----	----	----	----	----	----
TOTAL INFLOW	410	1,028	1,420	1,569	1,009	1,237	1,466	1,708	2,164	2,388	2,513	2,365	2,244	2,243	2,249	2,252	2,256
CASH OUTFLOW																	
Investments																	
Honam Plant	----	----	277	113	----	14	----	13	11	----	9	----	----	----	----	----	----
Central Plant	----	----	613	467	133	9	20	6	18	12	7	----	----	----	----	----	----
KDBC Farm Lending																	
IDA Funds - Farm Development	----	158	693	986	36	----	----	----	----	----	----	----	----	----	----	----	----
IDA Funds - Technical Services	----	26	18	20	25	----	----	----	----	----	----	----	----	----	----	----	----
Government Funds - Farm Development	20	145	215	113	----	----	----	----	----	----	----	----	----	----	----	----	----
Home Office Expenses - Farms	2	8	19	51	77	83	90	98	106	115	115	115	115	115	115	115	115
Other Farm Related Expenses 4/	----	10	11	50	63	60	69	79	88	101	104	106	112	119	126	128	128
TOTAL OUTFLOW	22	347	1,846	1,800	334	166	179	196	223	228	235	221	227	234	241	243	243
ANNUAL CASH BALANCE BEFORE DEBT SERVICE	388	681	(426)	(231)	675	1,071	1,287	1,512	1,941	2,160	2,278	2,144	2,017	2,009	2,008	2,009	2,013
DEBT SERVICE																	
IDA Credit - Processing (9%)																	
Interest	----	15	53	82	96	96	96	94	88	79	68	58	47	36	26	15	6
Principle	----	----	----	----	----	----	----	18	65	101	117	117	117	117	117	120	102
IDA Credit - Farms (3%)																	
Interest	----	19	45	67	69	69	69	67	62	54	46	39	31	24	16	8	3
Principle	----	----	----	----	----	----	----	70	167	248	255	255	255	255	255	256	188
Government Loan (5%) 5/																	
Interest	3	16	23	24	24	24	21	16	11	6	2	1	----	----	----	----	----
Principle	----	----	----	----	----	12	62	94	99	99	87	37	4	----	----	----	----
Short-term Loans																	
Interest	----	----	----	11	66	----	----	----	----	----	----	----	----	----	----	----	----
Principle	----	15	----	----	358	----	----	----	----	----	----	----	----	----	----	----	----
Foreign Exchange Risk 6/	----	1	5	4	5	10	15	30	57	87	102	113	122	130	137	143	117
TOTAL DEBT SERVICE	3	66	126	188	607	211	263	389	549	674	677	620	576	562	551	542	416
ANNUAL CASH BALANCE AFTER DEBT SERVICE	385	615	(552)	(419)	68	860	1,024	1,123	1,392	1,486	1,601	1,524	1,441	1,447	1,457	1,467	1,597
Less: Corporation Tax - 40%	----	----	----	----	----	344	410	449	557	594	640	610	576	579	583	587	639
NET CASH BALANCE	385	615	(552)	(419)	68	516	614	674	835	892	961	914	865	868	874	880	958

1/ Transition to current prices was based on inflation index of 8% compounded from 1976 to 1980 thereafter constant.
2/ Cash in-flows do not include deposits from farmers, suspense accounts, promissary notes, and other current liabilities of KDBC which were used to finance deficits in 1973 and 1974.
3/ Collections from farms include both the repayment of IDA loan and the Government loan to KDBC.
4/ Other Farm Related Expenses include animal insurance expenses of KDBC, research work expenses, business taxes paid on interest and insurance revenues and a 2% allowance for bad debts.
5/ The terms of the original credit agreement stipulate 3% for repayment to Government in 15 years. The calculation made here is 5% in 10 years as KDBC is currently paying Government.
6/ Foreign exchange risk calculated at 3% increase per annum from 1975.

KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Financial Projections for KDBC Project Account
(Won Million)

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
						(Constant 1975 Prices)							
CASH INFLOW													
Dairy Processing 1/													
Sales - Honam Plant	-	-	503	795	958	1,165	1,194	1,281	1,339	1,347	1,356	1,360	1,360
Sales - Central Plant 2/	-	-	520	1,154	2,203	2,500	2,946	3,235	3,399	3,632	3,645	3,675	3,675
Sales - Yeongnam Plant 3/	-	-	1,703	3,576	5,620	6,131	6,812	7,408	7,919	8,174	8,515	8,515	8,515
Sub-Total	-	-	2,726	5,525	8,781	9,796	10,952	11,924	12,657	13,153	13,516	13,550	13,550
CASH OUTFLOW													
Dairy Processing													
Operating Expenses - Honam Plant	-	-	421	638	768	922	945	1,026	1,070	1,075	1,093	1,095	1,095
Operating Expenses - Central Plant	-	1	418	864	1,573	1,778	2,088	2,302	2,417	2,577	2,584	2,607	2,607
Operating Expenses - Yeongnam Plant	-	-	1,109	2,200	3,386	3,708	4,102	4,453	4,753	4,900	5,093	5,093	5,093
Overheads and Home Office Expenses Allocated to Processing	-	111	594	825	963	1,007	1,051	1,102	1,129	1,149	1,169	1,171	1,171
Sub-Total	-	112	2,542	4,527	6,690	7,415	8,186	8,883	9,369	9,701	9,939	9,966	9,966
OPERATING SURPLUS (DEFICIT)	-	(112)	184	998	2,091	2,381	2,766	3,041	3,288	3,452	3,577	3,584	3,584
						(Current Prices)							
Operating Surplus (Deficit) 4/	-	(121)	215	1,257	2,844	3,500	4,066	4,470	4,833	5,074	5,258	5,268	5,268
CASH INFLOW													
Loans													
IBRD Loan - Farm Development 5/	-	1,181	941	901	345	-	-	-	-	-	-	-	-
IBRD Loan - Processing 6/	206	1,828	383	330	154	-	-	-	-	-	-	-	-
IBRD Loan - Technical Services	-	123	175	166	125	88	53	-	-	-	-	-	-
IBRD Loan - Farm Working Capital	-	94	92	6	-	-	-	-	-	-	-	-	-
NACF Loan - Farm Development 7/	-	403	407	432	210	-	-	-	-	-	-	-	-
NACF Loan - Farm Working Capital	-	23	23	2	-	-	-	-	-	-	-	-	-
Short-term Borrowings 8/	-	161	-	-	-	-	-	-	-	-	-	-	-
Farm On-lending													
Interest Revenue - Long Term (12%)	-	190	352	512	578	554	508	435	350	251	141	62	14
Interest Revenue - Short Term	-	-	14	14	1	12	6	-	-	-	-	-	-
Animal Insurance	-	-	30	45	47	50	53	57	61	66	71	76	82
Collections from Farms - Long-Term 9/	-	-	-	-	195	382	592	734	823	925	649	399	122
Collections from Farms - Short Term	-	-	117	115	8			-	-	-	-	-	-
Paid-in Capital 10/	120	450	200	-	-	-	-	-	-	-	-	-	-
TOTAL INFLOW	326	4,332	2,949	3,780	4,507	4,682	5,333	5,696	6,067	6,316	6,119	5,805	5,486
CASH OUTFLOW													
Investments													
Honam Plant	-	68	158	-	-	-	-	-	-	-	-	-	-
Central Plant	140	395	112	-	-	-	-	-	-	-	-	-	-
Yeongnam Plant	132	1,360	212	330	160	-	16	50	31	16	-	16	50
Total Contingency	86	782	132	83	21	-	-	-	-	-	-	-	-
KDBC Farm Lending													
IBRD Funds - Farm Development	-	1,181	941	901	345	-	-	-	-	-	-	-	-
IBRD and KDBC Funds for Technical Assistance	-	145	205	194	147	105	64	-	-	-	-	-	-
NACF Loan - Farm Development	-	403	407	432	210	-	-	-	-	-	-	-	-
IBRD and Government Funds for Working Capital Loans	-	117	115	8	-	-	-	-	-	-	-	-	-
Allocation of Home Office Expenses to Farm Development	-	11	61	95	105	114	114	114	114	114	114	114	114
Other Farm Related Expenses 11/	-	32	70	158	184	198	198	206	213	221	221	221	221
TOTAL OUTFLOW	358	4,494	2,413	2,201	1,172	417	392	370	358	351	335	351	385
ANNUAL CASH BALANCE BEFORE DEBT SERVICE	(32)	(162)	536	1,579	3,335	4,265	4,941	5,326	5,709	5,965	5,784	5,454	5,101
DEBT SERVICE													
IBRD Loan - Interest (8.5%)	18	304	435	557	612	619	622	588	540	478	410	341	272
Principle	-	-	-	-	-	-	23	398	568	727	799	809	815
NACF Loan - Interest (9%)	-	41	77	116	135	127	111	88	61	34	16	4	-
Principle	-	-	-	-	-	90	171	257	299	299	209	128	42
Short-term Loans - Interest (15.5%)	-	-	25	-	-	-	-	-	-	-	-	-	-
Principle	-	-	161	-	-	-	-	-	-	-	-	-	-
Foreign Exchange Risk on IBRD 12/	1	18	39	67	92	111	135	237	299	362	399	414	424
Less: Government coverage (48%)	-	9	19	32	44	53	65	114	144	174	191	199	203
KDBC Payment for Risk	1	9	20	35	48	58	70	123	155	188	208	215	221
TOTAL DEBT SERVICE	19	354	718	708	795	894	997	1,454	1,623	1,726	1,642	1,497	1,350
ANNUAL CASH BALANCE AFTER DEBT SERVICE	(51)	(516)	(182)	871	2,540	3,371	3,944	3,872	4,086	4,239	4,142	3,957	3,751
Less: Corporation Tax (40%)	-	-	-	348	1,016	1,348	1,578	1,549	1,634	1,696	1,657	1,583	1,500
NET CASH BALANCE	(51)	(516)	(182)	523	1,524	2,023	2,366	2,323	2,452	2,633	2,485	2,374	2,251
Add: Cash Balance - Project I	68	516	614	674	835	892	961	914	865	868	874	880	958
FINAL NET CASH BALANCE	17	-	432	1,197	2,359	2,915	3,327	3,237	3,317	3,501	3,359	3,254	3,209

1/ See Annex 5, Table 4.
2/ See Annex 5, Table 3.
3/ See Annex 5, Table 2.
4/ Transition to current prices was based on inflation index of 8% compounded from 1976 to 1980, there after constant.
5/ Fund Flows for loans and repayment are based on disbursement which includes price contingency of 38% and physical contingency of 10%.
6/ IBRD Loan includes start-up materials for Dairy Processing. See Annex 5, Table 5.
7/ Government loan does not include subsidies which are direct payments to farmers through the MAF. Loan includes contingencies on local costs of dairy development.
8/ Short-term borrowings taken by KDBC in commercial market at 15.5%.
9/ Collections from farms include both the repayment of the NACF loan and IBRD loan to KDBC. Farm loans have 3 year grace. 6 years repayment with 9% on pasture establishment funds and 12% on all other dairy farm lending.
10/ Paid in capital reflects the first 3 installments of share increases. It is expected that additional share capital for 1978, 1979 will not be necessarily given the degree of cash surpluses in these years and their transfer in part, to reserves.
11/ Includes animal insurance expenses of KDBC, business taxes paid on interest and insurance revenues, and a 2% allowance for bad debts.
12/ Foreign exchange risk calculated at 3% increase per annum; Government is to bear risk for on-farm funds, approximately 48% of total IBRD loan.

KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

KOREA DAIRY BEEF COMPANY

(Thousand Won)

	1969	1970	1971	1972	1973	1974
ASSETS						
I Current Assets						
Cash	111	178	192	707	595	1968
Deposits	15087	3739	192897	228537	199838	121888
Securities		250	210	1183	1623	8929
Accounts Receivable		368	1845	21115	19015	145045
Notes and Bills Receivable					4944	109253
Suspense Payments	57	11	7358	450141	25331	24567
Stocks and Finished Goods	153	36			6916	304511
Inventories of Sub-materials					15728	55832
Other Supplies	2461	2204	1733	4380	48239	74845
Calves	2951	5421	11238	10738	11137	17249
Guarantee Paid		414	450	6707	40374	67656
Other Assets		502	9882	109079	23790	79628
Sub-total	20820	13123	225805	832587	397530	1011371
II Fixed Assets						
A. Buildings and Structures	20715	52853	54286	70378	168212	438922
Machinery			83	5949	638938	759914
Vehicles	3342	7554	11119	22096	51735	89917
Land	49875	66636	67152	109909	115780	124642
Cows	2238	24462	29360	30170	30420	30483
Others	14805	16154	19879	67557	325573	197896
Less depreciation			6795	18415	34432	106195
Sub-total	90975	167659	175084	287644	1296226	1532579
B. Intangible Fixed Assets		3600	8993	10906	26865	92758
C. Investments						
L.T. Farm Loans Receivable			19865	318055	1207623	1600904
S.T. Farm Loans Receivable				4606	23404	24512
Total A, B and C	90975	171259	203942	621211	2554119	3250753
III Deferred Accounts	6615	26756	44483	56418	156663	760619
Total Assets	118410	211138	474230	1510216	3108311	5022743

	1969	1970	1971	1972	1973	1974
LIABILITIES						
I Current Liabilities						
Accounts Payable-Trade						53330
Accounts Payable		110	970	5289	176822	42590
Notes and Bills Payable					17809	81271
Short-Term Loans and Overdrafts		15000			30760	358000
Deposit Received			383		10488	27218
Revenues in Advance	12148	5181	24690	90863	111614	853
Guarantee Received					10757	21289
Others			9688	15197	9868	60457
II Fixed Liabilities						
Long-Term Loans from AFDC	10800		63200	310905	469905	493105
Long-Term Loan - IDA 1/				664980	1836629	3295959
Other Long-Term			665	2087	1671	10994
Reserves		3200		3865	3865	5819
TOTAL LIABILITIES	22948	23491	99596	1093186	2680188	4450885
III Stockholders Equity						
Paid-in Capital	100000	150000	330000	360000	400000	600000
Surplus or Deficit (earned)	-	(4539)	(4157)	1163	2630	(31190)
Government Subsidy and Other	-	41805	44664	46497	50973	59942
Reserves	---	-	-	-	10517	10516
Net Profit	(4538)	381	4127	9370	(35997)	(63410)
Total Stockholders Equity	95462	187647	374634	417630	428123	571858
Total Liabilities and Stockholders' Equity	118410	211138	474230	1510216	3108311	5022743

1/ Long-term loan payable to IDA differs from Project and Financial Projections as receipt of funds from Government and complete disbursement of funds by KDBC did not always fall in same financial year.

KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Korea Dairy Beef Company

Income Statement

(Current Prices - Million Won)

	Actual						Forecast												
	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Net Sales	0.9	6.9	17.3	40.4	59.9	1,715.8	5,239	6,793	11,084	16,600	23,704	28,360	31,440	32,869	33,947	34,676	35,209	35,259	35,259
Cost of Sales /1	0.6	5.5	28.0	44.5	52.2	1,403.4	4,410	5,146	8,706	12,468	17,123	20,561	22,667	23,617	24,318	24,777	25,097	25,134	25,134
Profit/Loss on Sales	0.3	1.4	(10.7)	4.1	7.7	312.4	829	1,647	2,378	4,132	6,581	7,799	8,773	9,252	9,629	9,899	10,112	10,125	10,125
Administrative Expenses /2	6.0	-	10.6	58.1	103.3	453.5	559	803	1,373	2,141	2,569	2,914	3,055	3,137	3,188	3,233	3,269	3,273	3,273
Net Operating Profit/Loss	(5.7)	1.4	(21.3)	(62.2)	(95.6)	(141.1)	270	844	1,005	1,991	4,012	4,885	5,718	6,115	6,441	6,666	6,843	6,852	6,852
Other Income /3	2.0	2.3	15.5	88.4	125.7	163.5	253	408	583	726	749	710	643	563	487	400	300	229	191
Total	3.7	3.7	5.8	26.2	30.1	22.4	523	1,252	1,588	2,717	4,761	5,595	6,361	6,678	6,928	7,066	7,143	7,081	7,043
Prior Year Adjustment	-	-	-	-	49.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Deductions /4	0.8	3.3	11.5	43.8	63.5	83.8	626	764	1,151	1,745	2,711	3,179	3,549	3,916	4,090	4,199	4,173	4,055	3,877
Net Profit/Loss	(4.5)	0.4	(17.3)	(17.6)	16.1	(61.4)	(103)	488	437	972	2,050	2,416	2,812	2,762	2,838	2,867	2,970	3,026	3,166
Profit/Loss Brought Forward	-	(4.5)	4.1	21.4	39.0	(22.9)	(84)	(187)	301	738	1,710	3,760	6,176	8,988	11,760	14,598	17,465	20,435	23,461
Profit/Loss Carried On	(4.5)	(4.1)	(21.4)	(39.0)	(22.9)	(84.3)	(187)	301	738	1,710	3,760	6,176	8,988	11,750	14,598	17,465	20,435	23,461	26,627

/1 Cost of Sales include inputs, operating costs, wages and saleries for all KDBC plants.

/2 Administrative Expenses include all overheads of home office for farm lending, marketing and sales expenses, as well as those costs incurred by KDBC for technical services, animal insurance expenses, research work, and business taxes paid on interest revenue.

/3 Other income includes interest revenues from on-farm lending, revenues from animal insurance, and payments made to KDBC for Government subsidy.

/4 Other deductions include debt service payments from Annex 3, Tables 2 and 3, and the estimated foreign exchange risk. The corporate tax of 40% after debt service is also included in these deductions.

REPUBLIC OF KOREA

SECOND INTEGRATION DAIRY DEVELOPMENT PROJECT

Financial Analysis - On Farm Development

A. Summary

1. The rates of return and sensitivity analysis for new 8 cow farms and restructured existing farms are estimated to be:

	Financial Rate of Return	If Income Increases		If Income Decreases	
		5%	10%	5%	10%
New Farms	20%	22	25	17	15
Existing Farms	28%	31	34	25	23

The range of the sensitivity analysis (0-10%) reflects the fluctuations between farm costs and income experienced in Project I.

2. Farmers are expected to base their decision to participate in the Project on the expected cash flow from the investments. The analysis indicates that the cash-flow including short-term borrowings of 8 cow farmers would be positive from year 3 of the Project. Project I farms reconstructed under Project II would have a positive cash flow in year 1 of Project II.

B. Methodology

3. Analysis of the costs and benefits of different size dairy units indicates that the minimum viable unit for the Project would be 8 ha with an initial herd of 8 cows. An examination of existing farms financed under Project I indicates that farms with less than 8 cows will not be able to overcome their present financial difficulties unless they receive additional cattle to increase their cow herd to 8 (para 2.18). Consequently, Project II would provide for:

(a) the establishment of new 8 ha - 8 cow units;

(b) reconstruction of ailing Project I farms to assure their viability in the long-term.

Two models were constructed: Model I represented new 8 ha - 8 cow units and Model II 5 ha - 5 cow units. Approximately 70% of farms in Project I are characterized by Model II. Full details of these models are presented in Tables 1-8 of this annex.

4. The qualitative and quantitative selection of inputs in Models I and II, detailed in this annex, are based on the results of analysis of KDBC farm records for the highest 15% of all Project I farms by net income per cow for the production years 1973-74. Average levels of farm inputs and outflows for these farms were then reviewed by the mission in consultation with FAO and agricultural universities and research institutions in Korea to ensure that the most efficient, but practicable, farming system was reflected in both models. Implementation of the technology underlying the inputs will require careful supervision and the provision of comprehensive farmer training programs.

5. All values in the analysis with one exception were based on April 1975 prices. The one exception was in Model II 1971 through 1974 where costs and benefits were valued at the estimated current prices for these years. This departure did not, however, affect the financial and economic rate of return for the Project since only those costs and benefits which relate exclusively to the investments under Project II were taken in the analysis.

C. Analysis

Investment Costs

6. Although similar investments would be required for Models I and II the existing farm was assumed to have sufficient facilities under Project I to support the herd increases proposed under Project II. Consequently the investment cost for Model II farms was considerably lower than that of Model I farms and included only the establishment of 2.0 additional hectares of pasture and 0.5 ha of fodder cropland, renovation of 4.0 ha of existing pasture, and purchase of 3 heifers, additional milk cans and coolers.

7. Costs for the establishment of pasture and fodder cropland included land clearing, fencing, essential roadworks, plowing, sowing and fertilizers. The cost per hectare for pasture establishment was 165,678 won at April 1973. This comprised the following costs:

Item	Won
Land clearance	65,000
Lime	10,600
Pasture seed	20,400
Fertilizers (N, P, K)	29,436
Labor for fertilizing and seeding	13,000
Farm road	10,600
Fencing materials	10,600
Inspection fee, surveying, etc.	6,042
	165,678

The investment cost for land clearance, fertilizers, seed, farm road, fencing and inspection fee for the establishment of 1.0 ha of corn in the first year of development was 246,249 won and for the establishment of 0.5 ha of barley 100,685 won. Government does not provide a subsidy to develop cropland.

8. Investment for water supply comprised a well, hand pump, piping and one trough at a total cost of 76,200 won.

9. The investments in buildings were:

	Description	Cost (won)
(a)	cowbarn: with small adjacent rooms for milk cooling, storage of concentrates, and accommodation for cowhand.	1,449,900
(b)	holding yard and shelter	27,924
(c)	haybarn: with storage space for fertilizers and machinery	134,250
(d)	silage pit	180,432

10. Investments in plant were:

	Description	Cost (won)
(a)	1 silage cutter: capacity 3.8 mt/hr	237,300
(b)	1/3 share in a petrol motor for silage cutter	38,420
(c)	1 electric fence: wire and posts	48,960
(d)	1 milk cooler: in-can type	10,203
(e)	9 milk cans: 40 liters capacity	91,800

11. Cattle received by farms would be 18 months old imported pregnant heifers, which when delivered on farm, cost 474,400 won each. The foreign exchange component would be about 90%. The choice to import pregnant heifers instead of heifer calves was determined by the need to provide sources of cash income to farmers as early as possible, and by the cost and organizational problems of raising calves to maturity in Korea.

12. Experience of shipments made in Project I shows that heifers should not be imported and distributed during the hot period from late June to early September. They should not be shipped when more than 5 months pregnant and they should be prepared for the journey by quiet handling and proper feeding before loading. Purchase arrangements should be made well ahead

to ensure that the mating and growth of cattle meet Korean specifications, particularly weight limits for air shipments.

Operating Costs

13. Operating costs reflected the inputs required under the proposed system of intensive pasture and concentrate feeding, to achieve yields of 4,000 kg of milk per cow per year after the first lactation. These costs included:

(a) labor: one permanent worker at 19,100 won per month commencing in the last quarter of year 1 when the cattle are delivered to the farm.

Casual labor was valued at 850 won per day for male labor and 650 won per day for female labor.

Casual labor costs per hectare of crop production were:

barley (land preparation, harvesting, threshing):	52,700 won/ha
corn (land preparation and ensilage);	105,000 won/ha
ryecorn (land preparation and 50% ensilage);	43,400 won/ha

Family labor is not included in the costs at this point but appears later under item 'subsistence allowance' and 'farm family labor'; valued at 300,000 won per year in years 1-6 and 350,000 won in years 6-13. Family labor is used to reduce investment costs as far as possible and contributes 10% of crop production labor in addition to other on-farm work.

(b) animal health: 6,300 won per animal unit per year. This included veterinary visits 2,640 won, drugs and medicine 3,660 won; artificial insemination - 3,200 won per cow per year.

(c) concentrate feed: 13% protein concentrate feed, costed at 64 won/kg and consumed as follows:

cows: 1 kg concentrate per 3 kg milk produced

heifers: 2 kg per day

calves: 1.5 kg per day.

Mineral supplements were valued at 1,800 won per animal unit per year, and calf starter at 20,000 won per calf per year;

(d) crop production excluding labor: the cost per ha was estimated to be:

	Seeds	Fertilizers	Total
	won		
barley	6,600	18,300	24,900
corn	9,000	26,600	35,600
ryecorn	8,000	15,100	23,100

(e) pasture maintenance: the cost per ha includes fertilizers in the following proportion:

200 kg urea (46%N) at 64 won/kg	12,800 won
250 kg potash (60% K_2O) at 26 won/kg	6,500 won
500 kg phosphate (20% P_2O_5) at 23 won/kg	11,500 won
Total cost per ha	30,800 won

(f) pasture renovation: pasture renewal would start in year 4 of farm development and continue each subsequent year; new farms would renovate 2.2 ha each year; existing farms would renovate 1.3 ha annually until year 3 of Project II and 2 ha thereafter. The cost per ha, excluding farm labor was:

fertilizers	14,000 won
seeds	16,900 won
hire of tractor	12,700 won
Total	43,600

(g) fuel and electricity: 8,000 won per farm per year.

(h) repairs and maintenance: calculated as a percentage of investment costs as follows:

buildings and water supply	2%
motorized plant	10%
milk cans and coolers	5%

Contingencies

14. Total investment costs included 5% contingencies. Operating costs were raised by 10% to account for contingencies and insurance.

Herd Projection and Yields

15. The carrying capacity of the developed farm was considered to be 1.75 animal units per ha. The herd projection used the following assumptions:

(a) natality: 90% in year 1 (pregnant heifers received)
85% in year 2
80% in year 3 and subsequent years

(b) mortality: adults 3%
calves 10%

(c) sales: cull cows - the percentage sales are indicated in Tables 2, 6 of this annex.

cull-heifers: 7%

good heifers: as the herd increases some good heifers were sold to keep the size within the limits of carrying capacity of the farm.

calves: all male calves and 16% of surviving heifer calves.

16. The animal units were summed as follows:

cows: average number of head at the beginning and end of the year.

heifers: 70% of average number of head at the beginning and end of the year;

calves: 30% of calves at the end of the year.

17. Milk yields are expected to be 3,000 kg per cow per year for the first lactation and 4,000 kg per cow per year for the subsequent lactations.

Sales

18. Milk sales were valued at 120 won per kg at the farmgate. Although the government minimum price is 110 won per kg, most farmers received 120 won per kg in April 1975.

19. The average prices for cattle sales were:

cull cow:	255,000 won
cull heifer:	200,000 won
good heifer:	350,000 won
calf:	47,000 won

20. Each farm was also assumed to produce farm produce for sale in nearby villages. This produce was valued at 120,000 won per year in year 1 and 60,000 won per year thereafter. In the first year of development, the timber from 5 ha cleared land and 0.5 ha barley gave a cash income of 180,200 won; and in years 3, 4 and 5, 116,600 won was received from the sale of 0.5 ha barley.

Financing of Investment Costs

21. Financing arrangements for investment costs for the new 8 cow farm (Model I) would be:

(a) Government subsidy of 97,400 won of a maximum 99,500 won available for pasture development. This subsidy applies to land development on slopes less than 30% with a density of forest of less than 30%. The subsidy finances land clearing, seeds, fertilizers, inspection fees and surveying. Land clearing is financed by a cash grant of 60,000 won, other items are granted in kind;

(b) NACF loan: for pasture development principally for the purchase of fertilizers 30,500 won per ha;

(c) NACF loan: for buildings, plant and water supply 741,500 won;

(d) IBRD loan: the foreign exchange component on all inputs for farm development; and

(e) Farmer's contribution: about 30% of total farm investment costs before the addition of physical and price contingencies.

22. Financing arrangements of investment costs for the existing farms (Model II) would be:

(a) Government subsidy: for pasture development 97,400 won per ha;

(b) NACF loan: for pasture development 30,500 won/ha;

(c) NACF loan: for purchase of plant 23,400 won;

(d) IBRD loan: foreign exchange component on all farm inputs; and

(e) Farmer's contribution: 30% of total farm investment costs before the addition of physical and price contingencies.

Debt-Service

23. Debt-service would include the payment of amortization and interests on the NACF and IBRD loans and the short term loans required to finance the gap between cash outflows and inflows during the initial years of development.

24. The NACF loan and the IBRD loan were lumped together in the analysis. Repayment was calculated on the basis of equal annuities including amortization and interest. The repayment period was nine years, including three years grace during which interests were capitalized.

25. Short term loans required in years 1, and 2 to overcome short-term deficits arising from heavy investments in year 1, would be repaid within one year and would bear an interest rate of 12%. A working capital fund would be established under the Project to provide the loans.

KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Dairy Farm Development - Model I: New 8 Cow Farm

Investment Costs
(Won '000)

Item	Unit	Units Project	Unit Cost	Per Farm Cost	Development Phasing Year 1	Development Phasing Year 2	US$ Equivalent	Foreign Component %	Exchange Value Equiv. US$
Pasture Establishment:									
Pasture	ha	6.5	165.7	1077.1	580	497.1	2244	11	247
Crop 1/	"	1.5	231.3	346.9	346.9	-	723	11	80
Water Supply 2/	unit	1	76.2	76.2	76.2	-	159	20	32
Buildings:									
Cowbarn	cow	11	131.8	1449.8	1449.8	-	3020	10	302
Holding Yard and Shelter	"	11	2.5	27.5	27.5	-	57	10	6
Silo	"	11	16.4	180.4	180.4	-	376	10	38
Haybarn	"	11	12.2	134.2	134.2	-	280	10	28
Plant:									
Silage Cutter	unit	1	237.3	237.3	237.3	-	494	50	247
Motor (1/3 share)	"	1/3	115.2	38.4	38.4	-	80	50	40
Electric Fence, posts & wire	"	1	49	49	49	-	102	20	20
Cooler	"	1	10.2	10.2	10.2	-	21	10	2
Milk Cans	"	9	10.2	91.8	61.2	30.6	191	10	19
Livestock 3/	head	8	474.4	3795.2	3795.2	-	7907	90	7116
Sub-total				7514	6986.3	527.7	15654	48	8177
Contingencies 5%				376	349.7	26.3	783	-	409
TOTAL				7890	7336	554	16437	48	8586

1/ The farmer is assumed to have 6.5 ha of potential pasture land and 1.5 ha of potential crop land for development under the project.

2/ Well, hand pump, piping and one trough.

3/ Seventeen month old pregnant heifers.

ANNEX 4
Table 1

KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Dairy Farm Development - Model I: New 8 Cow Farm (10 units)

Herd Projection

	Years of Project								
	1	2	3	4	5	6	7	8	9
Dairy cows on hand			72	64	76	82	86	92	98
plus bred heifers		80	-	24	20	23	26	28	22
Total to calve		80	72	88	96	105	112	120	120
Less deaths 3% /1		2	2	3	3	3	3	4	4
Less sale of culls		6	6	9	11	16	17	18	18
Total end year		72	64	76	82	86	92	98	98
Heifers	80	-	27	23	26	29	32	33	36
Less deaths 3% /1			1	1	1	1	1	1	1
Less sales /2			2	2	2	2	3	(3) 10	(3)13
Total end year	80	-	24	20	23	26	28	22	22
Calves (lactations)		72	61	70	77	84	90	96	96
Less calf deaths 10% /1		7	6	7	8	8	9	10	10
Less calf sales /3		38	32	37	40	44	48	50	50
Total end year		27	23	26	29	32	33	36	36
Total AU /4	33	84	93	105	115	124	133	140	141
Natality /1		90	85	80	80	80	80	80	80
Culling cows %		7	9	10	12	15	15	15	15
1st lactation 3000 kg.		216		57	48	54	63	66	54
2nd lactation 4000 kg.		-	244	204	244	264	276	296	312
Total Milk mt		216	244	261	292	318	339	362	366
Milk sales at 120 won/kg, won'000	-	25920	29280	31320	35040	38160	40680	43440	43920
Cattle sales /5									
Cows	-	1530	1530	2295	2805	4080	4335	4590	4590
Heifers	-	-	400	400	400	400	600	3050	4100
Calves	-	1786	1504	1739	1880	2068	2256	2350	2350
Total won '000	-	3316	3434	4434	5085	6548	7191	9990	11040
Concentrate									
Cows 1kg/3kg Milk	-	72	81	87	97	106	113	121	122
Heifers 2 kg/day	29	-	19	16	18	20	22	20	21
Calves 1.5/day	-	15	13	14	16	18	18	20	20
Total mt	29	87	113	117	131	144	153	161	163
Cost at 64 won/kg, on '000	1856	5568	7232	7488	8384	9216	9792	10304	10432
Mineral, 1800 won/AU, won '000	59	151	167	189	207	223	239	252	254
Calf starter, 20,000 won/calf, won '000	-	540	460	520	580	640	660	720	720
Total Feed Cost, on '000	1915	6259	7859	8197	9171	10079	10691	11276	11406

/1 Per cent parameters applied to figures at the beginning of the year.

/2 Heifers sold until year 7 are culls. Thereafter, culls which are included in heifer sales are shown in parenthesis. Good heifers are sold to keep the size of the herd within feasible limits.

/3 Sales include all surviving males and 16% of surviving heifers.

/4 Animal units calculated as follows: sum of the average number of cows at the beginning and the end of the year + 70% of the average of heifers at the beginning and the end of the year + 30% of calves at the end of the year.

/5 Cattle are sold at the following prices: 255,000 won per cull cow; 200,000 won per cull heifer; 350,000 won per good heifer; and 47,000 won per calf.

KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Dairy Farm Development - Model I: New 8 Cow Farm

Sales and Operating Costs
(Won'000)

	Years									Foreign Component
	1	2	3	4	5	6	7	8	9-13	%
Sales										
Milk 1/	-	2592	2928	3132	3504	3816	4068	4344	4392	
Cattle 1/	-	332	343	443	509	655	719	999	1104	
Timber and Crop 2/	223	180	117	117	117	-	-	-	-	
Farm Produce 3/	120	60	60	60	60	60	60	60	60	
Total	343	3164	3448	3752	4190	4531	4847	5403	5556	
Operating Costs										
Labor: Permanent 4/	57	229	229	229	229	229	229	229	229	-
Casual 5/	-	176	176	176	176	170	223	223	223	-
Animal Health and AI 6/	21	76	71	89	97	105	113	119	120	3
Concentrate Feed 1/	192	626	786	820	917	1008	1069	1128	1141	52
Crop Production 7/	-	84	84	84	84	79	91	91	91	30
Pasture Maintenance 8/	108	200	200	200	200	200	200	200	200	30
Pasture Renovation 9/	-	-	-	94	94	94	94	94	94	30
Fuel & Electricity	8	8	8	8	8	8	8	8	8	60
Repairs and Maintenance										
Buildings, Water Supply (2%)	37	37	37	37	37	37	37	37	37	10
Motorized Plant (10%)	33	33	33	33	33	33	33	33	33	50
Milk Cans and Coolers (5%)	3	5	5	5	5	5	5	5	5	10
Sub-total	459	1474	1629	1775	1880	1968	2102	2126	2181	
Contingencies and Insurance (10%)	46	147	163	178	188	197	210	213	218	
TOTAL	505	1621	1792	1953	2068	2165	2312	2339	2399	
Net Operating Income	(162)	1543	1656	1799	2122	2366	2535	3064	3157	

1/ From Table 2.
2/ Timber from cleared land in Year 1 and cashcrop from fodder cropland in Years 1 to 5.
3/ Farm produce obtained without any additional cost.
4/ Wage: won 19,100/month.
5/ The cost per hectare of casual labor is: corn won 105,000; ryecorn won 43,400; barley won 52,700.
6/ Won 6,300 per AU for animal health and won 3,200 per cow for AI.
7/ Includes: seeds: won 9,000/ha corn, won 8,000/ha ryecorn and won 6,600/ha barley; and fertilizers: won 26,600/ha corn, won 15,100/ha ryecorn, and won 18,300/ha barley. The cost of production in Year 1 is included in investment costs.
8/ Only includes fertilizers: urea won 12,800/ha, potash won 6,500/ha, phosphate won 11,500/ha.
9/ Pasture renovation: fertilizers won 14,000/ha, seeds won 16,900/ha, tractor hire won 12,700/ha.

Note: Prices April 1975

KOREA

Second Integrated Dairy Development Project

Dairy Farm Development - Model I: New 8-Cow Farm

Cash Flows
(Won '000)

	Years									
	1	2	3	4	5	6	7	8	9	10-13
Inflows										
Sales	343	3164	3448	3752	4190	4531	4847	5403	5556	5556
Subsidy	341	292	-	-	-	-	-	-	-	-
Long-term loan (1) 1/	107	91	-	-	-	-	-	-	-	-
Long-term loan (2) 2/	4729	40	-	-	-	-	-	-	-	-
Short-term loan	1039	511	-	-	-	-	-	-	-	-
Farmer's contribution	2159	130	-	-	-	-	-	-	-	-
Total	8718	4228	3448	3752	4190	4531	4847	5403	5556	5556
Outflows										
Investment costs	7336	554	-	-	-	-	-	-	-	-
Operating costs	505	1621	1792	1953	2068	2165	2312	2339	2399	2399
Total	7841	2175	1792	1953	2068	2165	2312	2339	2399	2399
Cash balance before debt service	877	2053	1656	1799	2122	2366	2535	3064	3157	3157
Debt Service										
Long-term loan (1) outstanding	(107)	(198)	(198)	(198)	(172)	(143)	(112)	(78)	(41)	-
interest (9%)	10	18	18	18	15	13	10	7	4	-
amortization	-	-	-	26	29	31	34	37	41	-
Long-term loan (2) outstanding	(4729)	(4769)	(4769)	(4769)	(4181)	(3522)	(2785)	(1960)	(1035)	-
interest (12%)	567	572	572	572	502	423	334	235	124	-
amortization	-	-	-	588	659	737	825	925	1035	-
Short-term loan interest (12%)	-	124	61	-	-	9	-	-	-	-
Short-term amortization	-	1039	511	-	-	78	-	-	-	-
Debt service	577	1753	1162	1204	1205	1204	1203	1204	1204	-
Cash balance after debt service	300	300	494	595	917	1162	1332	1860	1953	3157
Subsistence allowance	300	300	300	300	300	350	350	350	350	350
Net income	-	-	194	295	617	812	982	1510	1603	2807

1/ NACF loan for pasture establishment.
2/ NACF and IBRD loan for water-supply, buildings, plant and livestock.

ANNEX 4
Table 4

KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Dairy Farm Development Model II : Existing Farm
Investment Costs
(Won '000)

Item	Unit	Units in Project I*	Units in Project II	Unit Cost	Per Farm Cost	Development Phasing Year I	Development Phasing Year 3	US $ equivalent	Foreign component %	Exchange value equiv. US $
Pasture Establishment /1										
Pasture	ha	4	2	165.7	331.4	331.4	-	690	11	76
Crop	ha	1	0.5	231.3	115.7	115.7	-	241	11	27
Buildings										
Cowbarn	cow	8	-							
Holding yard and shelter	"	8	-							
Silo	"	8	-							
Haybarn	"	8	-							
Stockman housing	m^2	20	-							
Plant										
Silage cutter	unit	1	-							
Water pump and motor	"	1	-							
Electric fence	"	-	1	49	49	49	-	102	20	20
Milk cans	"	4	4	10.2	40.8	20	20.8	85	10	9
Pasture renovation /2	ha	-	4	40	160	160	-	333	30	100
Livestock /3	head	5	3	474.4	1423.2	1423.2	-	2965	90	2669
Subtotal	-	-	-	-	2120.1	2099.3	20.8	4416	62	2901
Contingencies 5%	-	-	-	-	105.9	104.7	1.2	221		145
Total	-	-	-	-	2226	2204	22	4637	62	3046

/1 Developed under Integrated Dairy/Beef Development Project I (Cr. 234-KO).
/2 Upgrading of existing pasture
/3 18 month old pregnant heifers

Note: * Total on-farm investment costs for Project I averaged won 3,380,000 per farm

ANNEX 4
Table 5

KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Dairy Farm Development Model II; Existing Farm

(10 Units)

Herd Projection

	PROJECT I				PROJECT I AND PROJECT II							
	1	2	3	4	5	6	7	8	9	10	11	12
Dairy cows on hand	-	-	45	40	47	51	81	80	87	93	96	97
Plus bred heifers	-	50	-	15	13	45	16	26	26	25	23	22
Total to calve	-	50	45	55	60	96	97	106	113	118	119	119
Less deaths 3% /1	-	1	1	2	2	3	3	3	3	4	4	4
Less sales	-	4	4	6	7	12	14	16	17	18	18	18
Total end of year	-	45	40	47	51	81	80	87	93	96	97	97
New heifers /2	-	-	-	-	(30)	-	-	-	-	-	-	-
Heifers on hand	50	-	17	14	17	18	29	29	31	34	36	36
Less deaths 3% /1	-	-	1	-	1	1	1	1	1	1	1	1
Less sales /3	-	-	1	1	1	1	2	2	(2) 5	(3) 10	(3)13	(3) 13
Total end of year	50	-	15	13	45	16	26	26	25	23	22	22
Calves (lactations)	-	45	38	44	48	77	78	85	90	94	95	95
Less deaths 10% /1	-	4	4	4	5	8	8	9	9	9	10	10
Less sales /4	-	24	20	23	25	40	41	45	47	49	49	49
Total end of year	-	17	14	17	18	29	29	31	34	36	36	36
Total AU /5	21	53	58	66	82	109	117	125	133	138	139	139
Natality /1	-	90	85	80	80	80	80	80	80	80	80	80
Culling cows %	-	7	9	10	12	12	14	15	15	15	15	15
1st lactation 3000/kg	-	135	-	36	30	108	39	63	60	60	54	53
2nd lactation 4000/kg	-	-	152	128	152	164	260	256	280	294	308	310
Total milk mt	-	135	152	164	182	272	299	319	340	354	362	363
Milk sales, Won '000 /6	-	10800	15960	19680	21840	32640	35880	38280	40800	42480	43440	43560
Cattle sales: /7												
Cows	-	940	1020	1530	1785	3060	3570	4080	4335	4590	4590	4590
Heifers	-	-	200	200	200	200	400	400	1450	3050	4100	4100
Calves	-	748	940	1081	1175	1880	1927	2115	2209	2303	2303	2303
Total won '000	-	1688	2160	2811	3160	5140	5897	6595	7994	9943	10993	10993
Concentrate:												
Cows 1/3kg milk	-	45	51	55	61	91	100	106	113	118	121	121
Heifers 2kg/day	18	-	12	10	23	12	20	20	20	21	21	21
Calves 1.5kg/day	-	9	8	9	10	16	16	17	19	20	20	20
Total mt	18	54	71	74	94	119	136	143	152	159	162	162
Concentrate Cost, won '000 /8	630	2160	3905	4736	6016	7616	8704	9152	9728	10176	10368	10368
Minerals won '000 /9	32	80	87	119	148	196	211	225	239	248	250	250
Calf starter won '000 /10	-	272	224	340	360	580	580	620	680	720	720	720
Total feed cost won '000	680	2512	4216	5195	6524	8392	9495	9997	10647	11144	11338	11338

/1 Per cent parameters are applied to figures at the beginning of the year.
/2 New heifers added to existing farms (3 head per farm) in year 5 of farm development.
/3 Heifers sold until year 8 are culls. Thereafter, culls which are included in heifer sales are shown in parentheses. Good heifers are sold to keep the size of the herd within feasible limits.
/4 Sales include all surviving males and 16% of surviving heifers.
/5 Animal units calculated as follows: sum of average of cows at the beginning and end of the year + 70% of average of heifers at the beginning and end of year + 30% of calves at end of year.
/6 Price of milk: 70 won/kg in 1972; 80 won/kg in 1973; 105 won/kg in 1974; 120 won/kg in 1975 and thereafter.
/7 Cattle are sold at the following prices: cull cow 225000 won in 1972; 235000 won in 1973; 255000 won in 1974 and thereafter; cull heifers 180 000 won in 1972; 185000 won in 1973; 200000 won in 1974 and thereafter good heifers 350000 won; calves 44000 won in 1973, 47000 won in 1974 and thereafter.
/8 Concentrate costs 35 won/kg in 1972; 40 won/kg in 1973, 55 won/kg in 1974; 64 won/kg in 1975 and thereafter.
/9 1500 won/AU from 1972-1974 and 1800 won/AU thereafter.
/10 16000 won/calf from 1972-1974 and 20000 won/calf thereafter.

ANNEX 4
Table 6

KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Dairy Farm Development - Model II: Existing Farm

Sales and Operating Cost
(Won '000)

	PROJECT I				PROJECT I and PROJECT II								Foreign Component %
	1	2	3	4	5	6	7	8	9	10	11	12-13	
Sales													
Milk /1	-	1,080	1,596	1,968	2,184	3,264	3,588	3,828	4,080	4,248	4,344	4,356	
Cattle /1	-	169	216	281	316	514	590	660	799	994	1,099	1,099	
Timber and cash crop /2	95	-	-	-	170	117	117	-	-	-	-	-	
Farm produce /3	90	100	100	100	60	60	60	60	60	60	60	60	
Total	185	1,349	1,912	2,349	2,730	3,955	4,355	4,548	4,939	5,302	5,503	5,515	
Operating Costs													
Labor: Permanent /4	144	180	216	229	229	229	229	229	229	229	229	229	-
Casual /5	137	125	132	140	176	176	176	170	223	223	223	223	-
Animal health and AI /6	10	38	41	59	68	95	99	107	114	118	119	119	3
Concentrate feed /1	68	251	422	519	652	839	949	1,000	1,065	1,114	1,134	1,134	52
Crop Production /7	32	36	36	59	84	84	84	79	91	91	91	91	30
Pasture maintenance /8	63	71	71	123	185	185	185	185	185	185	185	185	30
Pasture renovation /9	-	-	-	-	-	-	-	87	87	87	87	87	30
Fuel and electricity	4	4	6	7	8	8	8	8	8	8	8	8	60
Repairs and Maintenance													
Buildings, water supply (2%)	17	17	17	17	18	18	18	18	18	18	18	18	10
Motorized plant (10%)	24	24	24	24	24	24	24	24	24	24	24	24	50
Milk cans and coolers (5%)	2	2	2	2	3	3	4	4	4	4	4	4	10
Sub-Total	501	748	967	1,179	1,447	1,661	1,776	1,911	2,048	2,101	2,122	2,122	
Contingencies and insurance (10%)	50	75	97	118	145	166	178	191	205	210	212	212	
Total	551	823	1,064	1,297	1,592	1,827	1,954	2,102	2,253	2,311	2,334	2,334	
Net Operating Income	(366)	526	848	1,052	1,138	2,128	2,401	2,446	2,686	2,991	3,169	3,181	

NOTE: Years 1 to 4 are previous Project years; years 5-13 are projected in current 1975 prices.

/1 From Table 6
/2 Timber from cleared land (5ha) in Year-1 and in Year-5 (2.5 ha). Barley from half ha of cropland in Years 5-7.
/3 Farm produce estimated at 90,000 won in 1972; 100,000 won in 1973 and 1974 and 60,000 thereafter.
/4 Wage 12,000 won/month in Year-1 ; 15,000 won/month in Year-2, and 18,000 won/month in 1974 19,100 won/month in 1975 and thereafter.
/5 Cost per ha of casual labor: corn: 105,000 won; ryecorn 43,400; barley 52,700. The costs for 1972 and 1973 are 10% and 5% respectively lower than the above costs.
/6 Animal health 6,300 won per AU and AI 3,200 won/cow. Costs for 1972 are 10% lower, and for 1973 8% lower and for 1974 6% lower than 1975 levels.
/7 Includes: seeds: 9,000 won/ha corn; 8,000 won/ha ryecorn and 6,600 won/ha barley; fertilizer 26,600 won/ha corn; 15,100 won/ha ryecorn and 18,300 won/ha barley. Costs for 1972 are 10% lower, for 1973 8% lower and for 1974 are 6% lower than 1975 levels.
/8 Only includes fertilizers: urea 12,800 won/ha; potash 6,500 won/ha, phosphate11,500 won/ha. in 1975. In 1974 the costs were: urea: 13,650 won/ha; potash 2,400 won/ha; phosphate 5,600 won/ha. Costs in 1972 and 1973 were 10% and 5% lower respectively than 1974 costs.
/9 Includes: fertilizers 14,000 won/ha; seeds 16,900 won/ha; no pasture renovation required years 5,6 and 7 due to investment in year 5 for pasture establishment and renovation of project 1 pastures (See Table 5).

KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Dairy Farm Development - Model II: Existing Farm

Cash Flows
(Won '000)

	PROJECT I				PROJECT I AND PROJECT II								
	1	2	3	4	5	6	7	8	9	10	11	12	13
Inflows													
Sales 1/	185	1349	1912	2349	2730	3955	4355	4548	4939	5302	5503	5515	5515
Subsidy 2/	488	-	-	-	195	-	-	-	-	-	-	-	-
Long-term loan Project I 3/	1892	-	-	-	-	-	-	-	-	-	-	-	-
Long-term loan Project II 4/	-	-	-	-	1372	-	15	-	-	-	-	-	-
Short-term loan 5/	728	654	275	-	-	-	-	-	-	-	-	-	-
Farmer's contribution	1000	-	-	-	637	-	7	-	-	-	-	-	-
Total	4293	2003	2017	2349	4949	3955	4377	4548	4939	5302	5503	5515	5515
Outflows													
Investment costs 6/	3380	-	-	-	2204	-	22	-	-	-	-	-	-
Operating costs 1/	551	823	1064	1297	1592	1827	1954	2102	2253	2311	2334	2334	2334
Total	3931	823	1064	1297	3796	1827	1976	2102	2253	2311	2334	2334	2334
Cash balance before debt service	362	1180	953	1052	1153	2128	2401	2446	2686	2991	3169	3181	3181
Debt Service													
Long-term loan I outstanding 7/	(1892)	(1892)	(1892)	(1892)	(1642)	(1368)	(1070)	(744)	(389)				
Long-term loan I interest 9%	170	170	170	170	148	123	96	67	35				
Long-term loan I amortization	-	-	-	250	274	298	326	355	389				
Long-term loan II outstanding 12% 8/					(1311)	(1311)	(1311)	(1326)	(1163)	(981)	(776)	(546)	(289)
Long-term loan II interest 12%					157	157	157	159	140	117	93	66	35
Long-term loan II amortization 12%					-	-	-	163	182	205	230	257	289
Long-term loan II outstanding 9% 9/					(61)	(61)	(61)	(61)	(53)	(44)	(34)	(24)	(13)
Long-term loan II interest 9%					5	5	5	5	5	4	3	2	1
Long-term loan II amortization 9%					-	-	-	8	9	10	10	11	13
Short-term loan outstanding		728	654	275	-	-	-	-	-	-	-	-	-
Short-term loan interest 9%		66	59	25	-	-	-	-	-	-	-	-	-
Total Debt Service	170	964	883	720	584	583	584	757	760	336	336	336	338
Cash balance after Debt Service	192	216	240	332	569	1545	1817	1689	2386	2655	2833	2831	2843
Subsistence allowance	192	216	240	300	300	300	300	300	300	350	350	350	350
Net Income	-	-	-	32	260	1245	1517	1389	2086	2305	2483	2481	2493

1/ From Table 7.
2/ Subsidy for pasture establishment in 1972 was 122000 won/ha (86000 won from Central Government and 36000 won from Local Government), and in Year 5 (Year 1 of Project II) 97400 won/ha.
3/ Loan financed with IDA funds under Project I.
4/ Includes Government loan of 30500 won/ha for pasture establishment and IBRD Government loan for 70% of costs of livestock and pasture renovation (Year 5).
5/ One-year loan provided by Project I funds, and KDBC.
6/ From Table 5.
7/ Project I loan has 9 year repayment period, including 3 years grace during which only interest is paid. Interest rate 9%.
8/ Project II loan for buildings, water supply, plant and livestock has a 9 year repayment period including 3 years grace during which only interest is paid. Interest rate 12%.
9/ Project II loan for pasture establishment has a 9 year repayment period including 3 years grace during which only interest is paid. Interest rate 9%.

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SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Dairy Farm Development

Financial Rates of Return
(Won '000)

	Years of Development for Project II												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Model I:													
Farm sales	343	3164	3448	3752	4190	4531	4847	5403	5556	5556	5556	5556	5556
Value of herd	-	-	-	-	-	-	-	-	-	-	-	-	3438
Operating costs	(459)	(1474)	(1629)	(1775)	(1880)	(1968)	(2102)	(2126)	(2181)	(2181)	(2181)	(2181)	(2181)
Investment costs /1	(7336)	(554)	-	-	-	-	-	-	-	-	-	-	-
Long term interest	-	-	-	(825)	(721)	(603)	(473)	(328)	(165)	-	-	-	-
Short term interest	-	(55)	-	-	(25)	(15)	-	-	-	-	-	-	-
Family Labor	(300)	(300)	(300)	(300)	(300)	(350)	(350)	(350)	(350)	(350)	(350)	(350)	(350)
Balance	(7752)	781	1519	852	1264	1595	1922	2599	2860	3025	3025	3025	6463
Rate of return: 20%													
If benefits increase 10%: 31%													
If benefits decrease 10%: 6%													
Model II : Marginal Benefits and Costs due to Project II													
Farm sales	202	961	1230	1535	1926	2289	2490	2502	2502	2502	2502	2502	2502
Value of herd	-	-	-	-	-	-	-	-	-	-	-	-	1314
Operating costs	(115)	(390)	(395)	(558)	(709)	(767)	(790)	(790)	(790)	(790)	(790)	(790)	(790)
Investment costs /1	(2204)	-	(22)	-	-	-	-	-	-	-	-	-	-
Long term interest	-	-	-	(233)	(204)	(170)	(133)	(92)	(45)	-	-	-	-
Short term interest	(18)	-	-	-	-	-	-	-	-	-	-	-	-
Family Labor	(300)	(300)	(300)	(300)	(300)	(350)	(350)	(350)	(350)	(350)	(350)	(350)	(350)
Balance	(2435)	271	513	444	713	1052	1217	1270	1317	1362	1362	1362	2676
Rate of return : 28%													
If benefits increase 10% : 42%													
If benefits decrease 10% : 13%													

/1 Net of subsidies

ANNEX 4
Table 9

REPUBLIC OF KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Financial Analyses - Milk Processing Plants

A. Summary

1. Financial rates of return for the proposed dairy processing components are excellent, as summarized in the following:

Processing Facility	Rate of Return				
	Best Estimates	If Incomes Increase		If Incomes Decrease	
		10%	25%	10%	25%
Central Plant Extension	37%	54%	74%	12%	neg.
Honam Plant Expansion	31%	78%	100%	neg.	neg.
Yeongnam Plant	37%	53%	74%	16%	neg.

Sensitivity analysis of the proposed returns from processing was made at 10% and 25%, both increases and decreases to income of the three plants. A maximum range for fluctuation in income to total plant costs in Korea is likely to be 10%. Decreases of 10% to total sales do not seriously affect the total return on invested capital. Decreases of 25% in income would mean that plants would have negative rates of return, but a 25% margin of flexibility is highly unlikely.

B. Methodology

2. The parameters used in calculating the income and costs of the expansion projects at Honam and Central, and the frozen milk products plant at Yeongnam are itemized below. The underlying principle to the benefit and cost structures of the processing components was the forecast of raw milk production from farms in Project II described in Annex 4. All prices used for projection were based on April 1975.

C. Analysis

(i) Income

3. Yeongnam Plant. The proportion of ingredients used in the analysis for the production of frozen milk products was as follows: 100 mt of raw milk requires 5.75 mt whole milk powder, 4.59 mt anhydrous butter fat, 11.48 mt stabilizer, and 0.23 mt miscellaneous inputs. For every 1.0 mt of raw milk with this recipe, 1.11 mt of frozen milk products are produced. The specific gravity assumed for calculations was 0.65 and the price per ton of ice cream was as 767,100 won. Further details of the Yeongnam plant are contained in Table 2 of this annex.

4. Central Plant. Projections of Project II income from the Central plant assumed equal proportion of raw milk used to produce baby milk powder and powdered coffee creamer. Prices used for products were:

670 won per 500 gram can baby milk powder

1400 won per kg skim milk powder by-product

2000 won per kg powdered coffee creamer.

The Central plant also produces whole milk powder with an average sales value of 1,500 won per kg. For the purposes of analysis it was assumed that Project II milk would be allocated to powdered coffee creamer and baby milk powder, while Project I milk would continue to be used for the production of whole milk powder and baby milk powder. Every 1,000 mt of raw milk produces 333 mt of baby milk powder in the revised formula now used by KDBC. Every 1,000 mt of raw milk used for powdered coffee creamer produced 132 mt of the finished product and 145 mt of skim milk powder as a by-product. Further details of the Central plant are in Table 3 of this annex.

5. Honam Plant. Equal production of 200 cc Tetrapack and 500 cc brick packs was assumed for processing Project II raw milk. The normal 2% loss in quantity of milk produced was accounted for in extrapolating from the raw milk flow. The ex-factory prices used for Honam products were:

50 won per pack of 200 cc

120 won per brick of 500 cc

Details of the Honam Plant are in Table 4 of this annex.

(ii) Inputs

6. Yeongnam Plant. The following unit prices for inputs were used in the projections for ice cream production:

Input	Unit Price Per mt ('000 won)
Raw Milk	120
Whole Milk Powder	1,500
Fat	900
Sugar	394
Dextrose	166
Stabilizer	1,400
Miscellaneous	4,000

Ice cream would be produced in bars (60% of total production), cones (23%), cups (13%), and family packs (4%). These have volumes of 60, 90, 100 and 400 cc respectively. In proportion to total production, total packing cost for 1 mt of ice cream would be 111,000 won.

7. Central Plant. The material costs for the principal inputs in baby milk powder are based on a patented formula. Some of the costs are detailed below:

	Baby Milk Powder 1 mt Basis	Unit Cost '000 won	Amount '000 won
Vegetable Fat	125	900	112,500
Sucrose	23.5	183	4,300
Lactose	166.5	360	59,940
Protein Powder	180	680	122,400
Sugar	130	394	51,220

Imported materials cost 232,000 won for every 1 mt of baby milk powder produced. Local materials in the production of 1 mt of this powder cost approximately 386,000 won. Of the local costs, packing materials comprise 51%.

8. Cost analysis for powdered coffee creamer was also based on a patented formula. The principle input costs were raw milk valued at 120 won per liter and lactose at 510 won per kg. Skim milk powder was valued at 1,400 won per kg. Packing costs were 320 won per kg for glass bottle packs and 240 won per kg for paper sachets. The distribution of production per pack was 80% bottles and 20% pouch.

9. Honam: Primary inputs were raw milk (120 won per liter) and specialized paper for sterilized packing. Paper cost is approximately 8.2 won per Tetrapack and 18.5 won per Tetrabrick, both including duties and commodity tax. The duty on packing paper is 50% and the commodity tax is 5%.

10. Wages and Salaries. Wages and salaries for the Honam and Central plant expansions, as part of operating expenses, were calculated by taking the same proportion of these costs to total output when wages and salaries are projected for both Project I and Project II milk flows. Yeongnam wages and salaries were based solely on the number of employees required to operate the plant. All calculations were made from March 1975 salary levels.

Grade	Unit Wage Per Month (won)
Laborers	30,000
Technicians	65,000
Employees (5th gr.)	60,000
Employees (4th gr.)	80,000
Employees (2nd gr.)	130,000

Plant office salaries are also based on March 1975 pay scales and are included in operating expenses as are bonuses and reserves for retirement. KDBC home office salaries, with the exception of expatriate staff which are allocated to 'Management and Technical Services', are included in overhead costs for each plant and amount to one-third of plant wages and salaries.

11. Taxes. The primary tax on net profit of each plant is the 40% Korean Corporation tax. The actual tax basis for KDBC is total sales minus total costs x 40% less 600,000 won. Other taxes applied in the analysis were: (a) property tax of 3% of the plant and buildings and 2% on the cost of land. These taxes applied to all plants, are part of overheads in the financial rate of return; (b) License Tax and Stamp Charge 360,000 won at Honam plant.

12. Collection Centers (Honam and Central). The cost savings on collection centers is estimated to be 1.5 won per liter of milk at 5 mt per day collected. The projections for operating costs of a collection center in constant prices are:

Operation of Collection Center
(1975 thousand won)

	1977	1978	1979	1980	1981	1982	1983
Labor	3,401	4,475	4,475	4,475	5,370	5,370	5,370
Fuel and Power	1,368	1,642	1,916	1,916	2,190	2,190	2,464
Maintenance & Repairs	2,121	2,121	2,121	2,121	2,121	2,121	2,121
Insurance	317	317	317	317	317	317	317
Overheads	1,134	1,492	1,492	1,790	1,790	1,790	1,790
Sub-total	8,341	10,047	10,321	10,321	11,788	11,788	12,062
Tanker Operation	3,011	3,120	3,175	1,302	3,230	3,257	3,285
TOTAL	11,352	13,167	13,496	13,524	15,018	15,045	15,347

Tanker Operation was based on 1 run per day of 150 km (70 won per km with a full tanker). Collection vehicle costs are shown separately for the Yeongnam plant and are part of factory overheads at the Honam and Central plants.

(iii) Investment Costs

13. Investment costs were based on March 1975 prices. A price contingency of 36% based on a projected inflation index has been included in total Project cost. For the rate of return calculation, neither the price contingency nor physical contingency of 10% have been included in investment costs. Working capital, however, has been included in these costs. The estimated needs of plant working capital are as follows: 462 million won spread over 3 years at the Yeongnam plant; 75 million won over 2 years at the Honam plant and 262 million won over 2 years at the Central plant. Working capital in all three plants is based on KDBC stocking requirements of primary inputs, forward allowances made for seasonal variations, and stocking requirements of finished products. Table 5 of this annex includes the phasing of working capital requirements and assumptions used in calculations. The IBRD would finance 62% of the total working capital requirement in the proposed project (about 496 million won or US$1.03).

14. The phasing of investment costs for the expansion of the existing plants and the new plant at Yeongnam are summarized in Table 1 of this annex. Excluding contingencies and working capital, plant investments total 2.3 billion won (US$4.8 million). Year 1 represents the disbursements expected in November-December, 1975, about 8% of the total. About 70% of plant investments are phased in year 2, the first complete year of Project disbursements. The high percentage of capital for 1976 is a result of the necessity to plan, construct, and begin operation of the Yeongnam plant for the summer season in 1977.

ANNEX 5
Table 1

REPUBLIC OF KOREA

SECOND KOREA DAIRY DEVELOPMENT PROJECT

Disbursement Schedule for Dairy Processing
(Million Won)

Year	1 1975	2 1976	3 1977	4 1978	5 1979	Total	% FX
			Yeongnam Plant				
Land	28.0	-				28.0	-
Civil Works	-	52.0				52.0	49
Waste Water Treatment	-	54.4				54.4	49
Sub-total	28.0	106.4				134.4	38
Buildings							
Milk Reception	-	8.2				8.2	49
Ice Cream Processing	-	34.6				34.6	49
Freeser Store IC.	-	59.8				59.8	49
General Storage	-	33.1				33.1	48
Utilities	-	23.5				23.5	48
Laboratory	-	6.1				6.1	49
Office	-	8.8				8.8	49
Garage Workshop	5.6	5.6				11.2	48
Staff Hostel/ Facilities	9.8	11.3				21.1	48
Sub-total	15.4	191.0				206.4	49
Equipment & Machinery							
Evaporater	-	20.9		-		20.9	80
Milk Reception	-	60.7		-		60.7	57
Ice Cream Processing/ Packing	-	497.3		80.9		578.2	86
Refrigeration	-	245.2		53.8		299.0	86
Other Utilities	-	66.0		-		66.0	51
Workshop	14.6	-		-		14.6	73
Spare Parts	-	40.2		-		40.2	92
Laboratory	-	11.8		-		11.8	92
Offices	0.5	1.5		-		2.0	-
Milk Seperator	-	18.2		-		18.2	92
Electric Generator	-	22.9		-		22.9	92
Sub-total	15.1	984.7		134.7		1134.5	82
Cooling Depots	6.8	13.5	6.8			27.1	47
Design & Supervision							
Process Plant	10.9	20.3				31.2	55
Utilities, Waste Treatment	5.4	15.3				20.7	48
Buildings, Civil Works	5.5	7.0				12.5	49
Sub-total	21.8	42.6				64.4	52
Installation							
Process Plant		52.5		9.3		61.8	49
Utilities & Waste Treatment		29.3		12.0		41.3	49
Sub-total		81.8		21.3		103.1	49
Vehicles							
4.5 Ton Refrigerated			19.8	13.3	28.5	61.6	89
4.5 Ton Collection			14.1	4.8	18.6	37.5	89
Sub-total			33.9	18.1	47.1	99.1	89
TOTAL *	87.1	1420.0	40.7	174.1	47.1	1769.0	73
			Honam Plant				
Honam Expansion							
Sterilizing Gear		-	19.9			19.9	81
10 Ton Tanker		-	18.9			18.9	89
Cooling Depots (18)		9.8	9.7			19.5	47
Collection Center		-	74.2			74.2	49
Milk Seperator		18.2				18.2	92
TOTAL *		28.0	122.7			150.7	63
			Jinui Plant				
Jinui Expansion							
Waste Water Treatment			65.0			65.0	92
Milk Seperator		18.2				18.2	92
Electric Generator		22.9				22.9	92
Cooling Centers (7)		7.6				7.6	47
Collection Center		75.8				75.8	61
10 Ton Tanker		18.9				18.9	89
Evaporator Expansion		36.7				36.7	63
Condensed Milk Evaporator			46.6			46.6	63
Creap Process Plant	92.6					92.6	78
TOTAL *	92.6	180.1	111.6			384.3	73
GRAND TOTAL	179.7	1628.1	275.0	174.1	47.1	2304.0	71

US $ Equivalent = 4.80 million

* Excludes contingencies and working capital

Note: Subject to loan effectiveness, 1975 disbursement will be carried over to 1976

KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

YEONGNAM PROCESSING PLANT
(Won '000)

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
SALES: FROZEN MILK PRODUCTS													
Quantity Produced - MT	-	-	2,200	4,662	7,326	7,992	8,880	9,657	10,323	10,656	11,100	11,100	11,100
Sales 1/	-	-	1,703,000	3,576,300	5,619,900	6,130,800	6,812,000	7,408,100	7,919,000	8,174,400	8,515,000	8,515,000	8,515,000
PROCESSING EXPENSES													
Inputs													
Quantity Raw Milk - MT	-	-	2,000	4,200	6,600	7,200	8,000	8,700	9,300	9,600	10,000	10,000	10,000
Cost 2/	-	-	240,000	504,000	792,000	864,000	960,000	1,040,000	1,116,000	1,152,000	1,200,000	1,200,000	1,200,000
Quantity Whole Milk Powder - MT	-	-	115	241	379	414	460	500	535	552	575	575	575
Cost 3/	-	-	172,500	362,300	569,300	621,000	690,000	750,500	802,200	828,000	862,500	862,500	862,500
Foreign Subsidiary Materials 4/	-	-	273,120	573,600	901,320	983,280	1,092,480	1,188,120	1,269,960	1,311,000	1,365,600	1,365,600	1,365,600
Total Primary Inputs	-	-	685,620	1,439,900	2,262,620	2,468,280	2,742,480	2,978,620	3,188,160	3,291,000	3,428,100	3,428,100	3,428,100
Operating Costs													
Packing Costs	-	-	272,745	572,820	900,114	981,882	1,090,980	1,186,413	1,268,292	1,309,176	1,363,725	1,363,725	1,363,725
Salaries and Wages	-	-	61,645	62,125	72,925	84,805	86,845	92,782	93,983	96,383	96,383	96,383	96,383
Vehicle Operation	-	-	5,250	11,025	13,125	15,120	16,800	18,270	19,530	20,160	21,000	21,000	21,000
Maintenance and Repairs	-	-	22,321	22,321	22,321	32,463	32,463	32,463	32,463	32,463	32,463	32,463	32,463
Factory Overheads	-	-	71,316	89,460	112,266	122,346	129,024	141,498	148,302	148,428	148,554	148,554	148,554
Sub-total	-	-	433,277	757,751	1,120,751	1,236,616	1,356,112	1,471,426	1,562,570	1,606,610	1,662,125	1,662,125	1,662,125
Overheads 5/	-	111,000	379,348	539,609	609,305	630,361	652,940	674,217	691,017	700,116	711,016	711,016	711,016
Accumulation Depot Costs	-	-	600	2,200	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800
TOTAL PROCESSING EXPENSES	-	111,000	1,498,845	2,739,460	3,995,476	4,338,057	4,754,332	5,127,063	5,444,547	5,600,526	5,804,041	5,804,041	5,804,041
Gross Profit/loss	-	-111,000	204,155	836,840	1,624,424	1,792,743	2,057,668	2,281,037	2,474,453	2,573,874	2,710,959	2,710,959	2,710,959
Less: Corporation Tax	-	-	81,662	334,736	649,770	717,097	823,067	912,415	989,781	1,029,550	1,084,384	1,084,384	1,084,384
NET PROFIT/LOSS	-	-111,000	122,493	502,104	974,654	1,075,646	1,234,601	1,368,622	1,484,672	1,544,324	1,626,575	1,626,575	1,626,575
INVESTMENTS													
Land and Civil Works	80,000	54,400											
Buildings	15,400	191,000											
Equipment and Machines	15,100	984,700	-	134,700									
25 Accumulation Depots	-	5,430	16,240	5,430									
Design and Supervision	21,800	42,600											
Installation	-	81,800	-	21,300									
Vehicles 6/	-	-	33,900	18,100	10,602	-	10,602	33,900	21,204	10,602	-	10,602	33,900
Working Capital	-	-	162,000	150,000	150,000								
TOTAL INVESTMENT COSTS	132,300	1,359,930	212,140	329,530	160,602	-	10,602	33,900	21,204	10,602	-	10,602	33,900
RESIDUAL VALUE	-	-	-	-	-	-	-	-	-	-	-	-	463,327
Cash Flow	-132,300	-1,470,930	-89,647	172,574	814,052	1,075,646	1,223,999	1,334,722	1,463,468	1,533,722	1,626,575	1,615,973	2,056,002

Financial Rate of Return = 37%

Sensitivity
If benefits increase 10%, ROR = 53%.
If benefits increase 10%, ROR = 16%.

ANNEX 5
Table 2

1/ Price of ice-cream 767,100 won/MT, based on specific gravity of ice-cream at 0.65.
2/ Price of raw milk 120 won/kg.
3/ Price of whole milk powder 1,500,000 won per MT.
4/ Duties account for 15% of the cost.
5/ Overheads include selling expenses, business and local taxes, and a proportion of home office salaries and wages.
6/ Includes only refrigeration and delivery vehicles.

Note: Subject to loan effectiveness, 1975 investments will be carried over to early 1976.

KOREA

SECOND IRRIGATED DAIRY DEVELOPMENT PROJECT

CENTRAL DISTRICT PROCESSING PLANT

Expansion Project
(Won '000)

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
SALES													
Quantity MT Baby Milk Powder			260	577	1,099	1,247	1,471	1,614	1,696	1,813	1,819	1,834	1,834
Sales Total 1/			948,400	773,180	1,472,660	1,670,980	1,971,140	2,162,270	2,272,640	2,429,420	2,437,460	2,457,560	2,457,560
Quantity MT Coffee Creamer			66	146	279	317	373	410	431	460	462	466	466
Sales Total 2/			132,000	292,000	558,000	634,000	746,000	820,000	862,000	920,000	924,000	932,000	932,000
Quantity MT Skim Milk Powder, By-Product 3/			26	58	112	127	149	164	172	184	185	186	186
Sales Total			36,400	81,200	156,800	177,800	208,600	229,600	240,800	257,600	259,000	260,400	260,400
Quantity MT Butterfat Saved 4/			4	9	17	19	23	25	26	28	28	28	28
Cost Savings			3,600	8,100	15,300	17,100	20,700	22,500	23,400	25,200	25,200	25,200	25,200
TOTAL REVENUE			520,400	1,154,480	2,202,760	2,499,880	2,946,440	3,234,370	3,398,840	3,632,220	3,645,660	3,675,160	3,675,160
PROCESSING EXPENSES													
Inputs													
Quantity Raw Milk MT			1,000	2,217	4,225	4,794	5,655	6,206	6,518	6,968	6,994	7,051	7,051
Cost 5/			120,000	266,040	507,000	575,280	678,600	744,720	782,160	836,160	839,280	846,120	846,120
Imported Subsidiary Material			60,352	133,823	255,108	289,565	341,356	374,716	393,794	420,786	422,292	425,820	425,820
Duties			18,393	40,797	77,745	88,233	104,042	114,188	119,996	128,243	128,688	129,756	129,756
Local Subsidiary Material			143,119	317,407	605,203	686,875	809,410	888,655	933,975	997,599	999,175	1,009,553	1,009,553
Sub-total			341,864	758,067	1,445,056	1,639,953	1,933,408	2,122,279	2,229,925	2,382,788	2,389,435	2,411,249	2,411,249
Operating Costs 6/			64,320	92,141	114,020	124,197	139,491	164,444	170,064	178,036	178,514	179,559	179,559
Overheads 7/			28,245	60,597	98,855	111,842	131,625	143,514	151,443	161,802	162,356	163,674	163,674
Operation of Collection Center			11,353	13,167	13,496	13,524	15,018	15,045	15,347	15,347	15,347	15,347	15,347
Operation of Cooling Depots		350	770	770	770	770	770	770	770	770	770	770	770
Sub-total		350	104,688	166,675	227,141	250,333	286,904	323,773	337,624	355,955	356,987	359,350	359,350
TOTAL PROCESSING EXPENSES		350	446,552	924,742	1,672,197	1,890,286	2,220,312	2,446,052	2,567,549	2,738,743	2,746,422	2,770,599	2,770,599
Gross Profit/Loss		-350	73,848	229,738	530,563	609,594	726,128	788,318	831,291	893,477	899,238	904,561	904,561
Less: Corporation Tax		-	29,539	91,895	212,225	243,838	290,451	315,327	332,516	357,391	359,695	361,824	361,824
NET PROFIT/LOSS		-350	44,309	137,843	318,338	365,756	435,677	472,991	498,775	536,086	539,543	542,737	542,737
INVESTMENTS													
Milk Separator		18,200	-										
Electric Generator		22,900	-										
Evaporator Expansion		36,700	-										
Milk Evaporator		-	[illegible],500										
Cooling/Accumulation Depots		7,600	-										
Collecting Center and Tanker		94,700	-										
Waste Water Treatment		-	65,000										
Coffee Creamer Processing		92,600	-										
Working Capital	140,000	122,000	-										
TOTAL INVESTMENT COSTS	140,000	394,700	[illegible],500										
RESIDUAL VALUE													153,720
CASH FLOW	-140,000	-395,050	-67,291	137,843	318,338	365,756	435,677	472,991	498,775	536,086	539,543	542,737	696,457

Financial Rate of Return = 37%

Sensitivity

If benefits increase 10%, ROR = 54%.
If benefits decrease 10%, ROR = 12%.

1/ Baby powder milk is priced at 670 won per 500 g can or 1,340,000 won per MT.
2/ Powdered coffee creamer as produced in glass bottles and paper sachets with the average price per kg of 2,000 won.
3/ Skim milk powder is a by-product of coffee creamer production. 0.4 kg of skim milk powder is made available for sale or other uses from each 7.57 kg of raw milk used to produce the powdered creamer. Skim milk powder price is 1,400 won per kg.
4/ The cost-savings in butterfat input costs is derived from the clarified/standardizer. This savings is assumed on the additional .4% butterfat obtained from each kg of milk clarified, valued at 900 won per kg.
5/ 120 won per liter as in farm budget calculations.
6/ Operating costs include royalty to Morinaga, wages and salaries, maintenance and repairs, factory overheads and vehicle operation.
7/ Overheads include proportion of salaries, wages, and administrative expenses from home office, and business and local taxes.

Note: Subject to loan effectiveness, 1975 working capital including IBRD financed start-up materials will be carried over to 1976.

ANNEX 5
Table 4

KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Honam District Processing Plant

Expansion Project

(Won '000)

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
SALES: TETRAPACKED MILK												
Quantity - MT (AT Packer)	--	1,011	1,599	1,925	2,343	2,401	2,576	2,693	2,708	2,728	2,735	2,735
Sales 1/	--	252,750	399,750	481,250	585,750	600,250	644,000	673,250	677,000	682,000	683,750	683,750
Quantity - MT (AB Packer)	--	1,011	1,599	1,925	2,343	2,401	2,576	2,693	2,708	2,728	2,735	2,735
Sales 2/	--	242,640	383,760	462,000	562,320	576,240	618,240	646,320	649,920	654,720	656,400	656,400
Quantity - MT Butterfat Saved	--	8	13	16	19	20	21	22	22	22	22	22
Cost - Savings	--	7,200	11,700	14,400	17,100	18,000	18,900	19,800	19,800	19,800	19,800	19,800
TOTAL REVENUE	--	502,590	795,210	957,650	1,165,170	1,194,490	1,281,140	1,339,370	1,346,720	1,356,520	1,359,950	1,359,950
PROCESSING EXPENSES												
Inputs												
Quantity, Raw Milk (MT)	--	2,063	3,263	3,928	4,782	4,900	5,258	5,495	5,526	5,568	5,582	5,582
Cost 3/	--	247,560	391,560	471,360	573,840	588,000	630,960	659,400	663,120	668,160	669,840	669,840
Paper Excluding Duty	--	63,388	100,257	120,697	146,905	150,543	161,515	168,850	169,791	171,045	171,485	171,485
Duties	--	31,694	50,128	60,349	73,453	75,271	80,758	84,425	84,896	85,523	85,743	85,743
Sub-total	--	342,642	541,945	652,406	794,198	813,814	873,232	912,675	917,807	924,728	927,068	927,068
Operating Costs 4/	--	66,247	81,042	100,446	112,508	114,181	136,480	139,848	140,282	150,863	151,019	151,019
Overheads 5/	--	52,997	64,834	80,357	90,006	91,345	109,184	111,878	112,226	120,690	120,815	120,815
Collection Center Operation	--	11,352	13,167	13,496	13,524	15,018	15,045	15,347	15,347	15,347	15,347	15,347
Accumulation Centers	--	990	1,980	1,980	1,980	1,980	1,980	1,980	1,980	1,980	1,980	1,980
Sub-total	--	131,586	161,023	196,279	218,018	222,524	262,689	269,053	269,835	288,880	289,161	289,161
TOTAL PROCESSING EXPENSES	--	474,228	702,968	848,685	1,012,216	1,036,338	1,135,921	1,181,728	1,187,642	1,213,608	1,216,229	1,216,229
Gross Profit/Loss	--	28,362	92,242	108,965	152,954	158,152	145,219	157,642	159,078	142,912	143,721	143,721
Less: Corporation Tax	--	11,345	36,896	43,586	61,181	63,261	58,088	63,057	63,631	57,165	57,488	57,488
NET PROFIT/Loss	--	17,017	55,346	65,379	91,773	94,891	87,131	94,585	95,447	85,747	86,233	86,233
PROJECT INVESTMENT COSTS												
Collection Center and Tanker	--	93,100										
Accumulation Centers	9,800	9,700										
Sterilizing Gear	--	19,800										
Milk Separator	18,200	--										
Working Capital	40,000	35,000										
TOTAL INVESTMENT COSTS	68,000	157,600										
RESIDUAL VALUE	--	--	--	--	--	--	--	--	--	--	--	28,884
CASH FLOW	- 68,000	-140,583	55,346	65,379	91,773	94,891	87,131	94,585	95,447	85,747	86,233	115,117

Financial Rate of Return - 32%

Sensitivity

If benefits decrease 10%, ROR = negative.

If benefits increase 10%, ROR = 78%.

1/ Price for 200cc sterilized milk carton is 50 won or 250,000 won per MT.

2/ Price for 500cc sterilized milk carton is 120 won or 240,000 won per MT.

3/ 120 won per liter was used as in farm budgets.

4/ Includes lease on tetrapack, vehicle operation, maintenance and repairs, wages and salaries and factory overheads.

5/ Includes proportion of wages, salaries, and administrative expenses from home office, as well as all selling expenses and business and local taxes.

KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Working Capital Analysis
(Thousand Won)

Plant	1975			1976			1977			1978			1979			TOTAL		
	F.C	L.C	TOTAL	F.C	L.C	TOTAL	F.C	L.C	TOTAL	F.C	L.C	TOTAL	F.C	L.C	TOTAL	F.C	L.C	TOTAL
Yeongnam																		
Material Stock 1/	-	-	-	-	-	-	56,900	-	56,900	119,500	-	119,500	125,183	-	125,183	301,583	-	301,583
Forward Allowance 2/	-	-	-	-	-	-	-	51,630	51,630	-	-	-	-	-	-	-	51,630	51,630
Product Stock 3/	-	-	-	-	-	-	-	53,470	53,470	-	30,500	30,500	-	24,817	24,817	-	108,787	108,787
Total	-	-	-	-	-	-	56,900	105,100	162,000	119,500	30,500	150,000	125,183	24,817	150,000	301,583	160,417	462,000
Central																		
Material Stock 4/	51,400	-	51,400	68,017	-	68,017	-	-	-	-	-	-	-	-	-	119,417	-	119,417
Forward Allowance 5/	-	28,900	28,900	-	-	-	-	-	-	-	-	-	-	-	-	-	28,900	28,900
Product Stock 6/	-	59,700	59,700	-	53,983	53,983	-	-	-	-	-	-	-	-	-	-	113,683	113,683
Total	51,400	88,600	140,000	68,017	53,983	122,000	-	-	-	-	-	-	-	-	-	119,417	142,583	262,000
Honam																		
Material Stock 7/	-	-	-	40,000	-	40,000	35,000	-	35,000	-	-	-	-	-	-	75,000	-	75,000
Forward Allowance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Product Stock	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	40,000	-	40,000	35,000	-	35,000	-	-	-	-	-	-	75,000	-	75,000
Total																		
Material Stock	51,400	-	51,400	108,017	-	108,017	91,900	-	91,900	119,500	-	119,500	125,183	-	125,183	496,000	-	496,000
Forward Allowance	-	28,900	28,900	-	-	-	-	51,630	51,630	-	-	-	-	-	-	-	80,530	80,530
Product Stock	-	59,700	59,700	-	53,983	53,983	-	53,470	53,470	-	30,500	30,500	-	24,817	24,817	-	222,470	222,470
GRAND TOTAL	51,400	88,600	140,000	108,017	53,983	162,000	91,900	105,100	197,000	119,500	30,500	150,000	125,183	24,817	150,000	496,000	303,000	799,000

1/ Based on foreign material requirements - 1977, 1978: for 3 months; 1979: for 2 months; Annex 2, Table 1.
2/ 3% of Sales Amount in 1977; Annex 2, Table 1
3/ Based on Production cost - 1977: for 1 month; 1978: for 6 days; 1979: for 3 days; Annex 2, Table 1.
4/ Based on KDBC yearly plan - 1975: 11% of material requirements (467,224 x 0.11) in Central Plant.
5/ 10% of monthly Sales Amount in 1975 (289.000 x 10%) in Central Plant.
6/ Peak stock in 1975 in Central Plant.
7/ Based on foreign material required (based on 1975 plan) - 1977: for 1 month in Honam Plant

Note: All 1975 working capital expenditures will be carried over to 1976.

REPUBLIC OF KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Technical Assistance and Management Support

1. Adequate implementation of the technical components of the Project would require the use of internationally recruited specialists and employment of additional Korea technical specialists and field extension staff in KDBC. About 14 man years of internationally recruited specialist time, 21 man years of Korean technical specialist support and 60 man years of field extension work would be provided under the Project (Table 1). Farmer training programs would be extended under the Project and regular field days held in each of the three mill producing areas for the first few years of the Project.

Table 1: Project Technical Support

	Project Year					
	1976	1977	1978	1979	1980	1981
	Number of Man-Years					
Field extension officers	-	12	12	12	12	12
Technical Specialists						
Farm Records Analyst	1	1	1	1	1	-
Marketing	-	1	1	1	1	1
Pasture Management	-	1	1	1	1	1
KDBC Financial Management	1	1	1	1	1	1
Internationally Recruited Technical Specialists						
Dairy Husbandry Specialist	1	1	1	1	-	-
Animal Health/Nutrition	-	1	1	-	-	-
Pasture Management	1	1	1	1	-	-
Milk Processing	1	1	1	1	-	-

2. Costs for proposed technical assistance and management support are summarized in Table 2. IBRD would disburse 85% of net of tax expenditures to include emoluments, international travel, housing and research allowances of the Dairy Husbandry, Animal Health/Nutrition, Pasture Management and Dairy Processing specialists; 85% of total expenditures for jeeps and motorcycles and 85% of the cost of short-term consultant technical support in the latter years of the Project. Remaining costs would be met by the spread of funds from IBRD and NACF on-lent to farmers.

Table 2: Technical Assistance and Management Support

Category	Year of Disbursement (Million won) 1976	1977	1978	1979	1980	1981
Field extension officers	-	10.1	10.1	10.1	10.1	10.1
Technical specialists	4.8	9.6	9.6	9.6	9.6	7.2
Internationally recruited technical specialists	86.4	115.2	115.2	86.4	-	-
Consultant support	-	-	-	-	57.6	28.8
Sub-Total	91.2	134.9	134.9	106.1	77.3	46.1
Vehicles	7.2	8.2	-	-	-	-
Training programs	6.2	5.8	5.8	-	-	-
Total ('000 won)	104.6	148.9	140.7	106.1	77.3	46.1
Total (US$)	218,000	310,000	293,000	221,000	161,000	96,000

3. From mid-1974, technical services in KDBC were decentralized to give immediate responsibility for production and processing activities to managers at the central factory and Honam plant. Policy is decided by and in consultation with department directors from the KDBC Head Office in Seoul. The present distribution of personnel in KDBC Technical Services Department is given in Table 3.

Table 3: Distribution of KDBC Technical Services Department

	Central	Honam	Korean - New Zealand Demonstration Farm
Director	1	-	-
Technical Specialists	2	-	-
Assistant Agronomists	1	1	-
Veterinarians	3	-	1
Technicians			
Farm Advisory	6	5	2
Milk Quality	1	1	-
Purchases	2	1	1
Total	18	8	5

4. To date, the technical services offered farmers by KDBC have been inadequate. At times there has been only one technician per 90 farms. Farm visits, particularly during the critical summer and autumn months, have occurred as infrequently as once every 10 weeks. This problem has been further aggravated by the lack of dairy farming experience of the new university graduates employed in the Department. The Project would provide one experienced technician for every 50 farms and would equip them with motorcycles

to improve their mobility. In-service training programs are held regularly for technicians and the more outstanding of them have good opportunities to obtain additional training overseas under bilateral aid agreements and the Colombo Plan. Five farm technicians and three processing technicians have each received one year of training in New Zealand. Short-term fellowships for three technicians to Taiwan and one to New Zealand were requested in late 1974 and approval is awaited.

5. To strengthen policy-making in KDBC Head Office and provide direction for field staff, the Project would provide a Korean specialist in Farm records analysis, marketing, pasture and forage crop management, and KDBC financial management. Each of these areas has been identified over the course of Project I as being particularly weak and in need of correction. Of greatest concern is the weak marketing structure in KDBC, particularly in light of the need for marketing of ice cream, baby milk powders and the proposed coffee creamer. In addition to the provision of a marketing specialist, a technical service agreement on a fee paying basis should be sought between KDBC and an overseas ice cream company with a good marketing record.

6. Expatriate specialists are required to introduce technical innovations in the Project and train new technicians to take over when their appointments expire. Considerable progress in this regard was made under Project I, but the different nature of the inputs and the greater level of efficiency required under the proposed project necessitates continuation of the assistance. The advisors would be expected, where appropriate, to hold formal farmer training sessions and research and publish improved production techniques. An allowance of US$10,000 per specialist per year has been included in the cost for internationally recruited technical specialists to facilitate research. Details of their terms of reference are in the Appendices to this Annex.

7. The project would provide for considerable extension of the farmer training programs available in Project I. Training for farmers is conducted in residence at the Korea-New Zealand Pyongtaek Dairy Demonstration Farm and by seminars and field visits in the countries. Table 4 summarizes the training courses conducted by KDBC for farmers and field technicians from 1972-1974.

Table 4: KDBC Training Courses 1972-1974

	1972	1973	1974
	People Attending		
Farmer's Training			
10-20 day courses	124	120	60
3-6 week courses	14	46	31
6 week - 6 month courses (college students)	6	9	10
One day seminars (counties)	100	551	1,090

8. The mission considers that partial training should be obligatory for farmers entering the proposed project without any experience with dairy cattle. A four-week course would be provided for 120 farmers in 1975, 150 farmers in 1977 and 180 farmers in 1978. Each course would accommodate 30 farmers and would provide about 100 hours of lectures in animal feeding, reproduction, milk production and hygiene, animal health and farm planning, and recording. There would be about 100 hours of farm practical training and 25 hours of farm visits. The cost for each course would be about 644,000 won (US$1,342) and would be financed under the Project.

9. Farmers receiving assistance to develop existing properties into viable units would also be required to attend a 10 day course at the Pyong-taek Demonstration Farm. Three hundred and twenty farmers would be trained in 1976 and 80 in 1977. The range of subject matter would be similar to that for the new farmer courses, but would be pitched at a level commensurate with their experience. The cost per course of 30 is estimated to be 250,000 won (US$522) and would be met out of project funds.

10. A one-week course would be offered farmers who seek additional training one year after receipt of their cattle. This course would have approximately 20 hours of lectures, 16 hours of discussion and 18 hours of farm practical work. KDBC estimates that about 180 farmers would request training in 1977 and another 180 in 1978. The cost per course of 30 would be 166,000 won (US$34). In addition to the follow-up course, one-day field seminars would be held regularly throughout the milk producing areas.

11. The costs for farmer training provided in the project are summarized in Table 5.

Table 5: Cost of Farmer Training Programs
(Won)

Course	1976	1977	1978
New farmer courses (4 weeks)	3,032,000	3,520,000	4,164,000
Existing farmer courses (10 days)	2,676,000	656,000	-
Follow-up courses (1 week)	-	996,000	996,000
Field Seminars (1 day)	285,000	331,000	383,000
Total (Won)	5,993,000	5,512,000	5,543,000
Total (US$)	12,485	11,483	11,547

TERMS OF REFERENCE FOR TECHNICAL ASSISTANCE AND MANAGEMENT SUPPORT

1. Technical Director - Dairy Husbandry Specialist - would act as a Technical Director within the Department of Technical Service, Korea Dairy Beef Co., (KDBC). Including, but not limiting the generality thereof, he would have the following minimum specific duties, responsibilities, and powers which he might delegate in whole or in part to assigned technical staff:

(a) advising the administrative officials (President and Director, Department of Technical Services) on major policy decisions in respect of the dairy farm development sub-project;

(b) executing the sub-project in accordance with the policies and procedures agreed to between IBRD, Government and KDBC;

(c) overseeing the selection and employment of the field extension staff required to implement the sub-project activities;

(d) training the field staff in the technical economic and financial aspects of livestock production in particular the preparation of dairy farm development plans and the keeping and analysis of farm management records;

(e) reviewing farmer training manuals and extension material, and where, appropriate supervise the updating and inclusion of additional material considered of benefit to farmers;

(f) approving or disapproving dairy-farm development plans prepared and appraised under the sub-project and recommending approved plans to KDBC for lending;

(g) guiding KDBC in the selection of the design and specifications of cow barns and feeding arrangements; design and specifications of milking parlors and milking plants; milking practices, hygienic milk production, mastitis identification and control; approving participating farmers; organizing, approving and giving overall supervision to the AI technical service; and in cooperation with KDBC's processing plants, maintaining a quality control service; and other technical components of development plans;

(h) providing such supervision and technical assistance as necessary to ensure successful completion of each dairy farm development plan and loan;

(i) giving assistance and cooperation to the animal health/nutrition and pasture management specialists to implement their terms of reference;

(j) fostering where possible simple applied research projects to overcome some of the technical barriers to raising the efficiency of dairy farms; and

(k) providing Government and IBRD with regular critical reports on the progress of the farm development sub-components of the project, identifying present and future problem areas and recommending courses of action.

2. Animal Health/Nutrition Specialist - would be attached to and administratively responsible to the Technical Services Department KDBC. Including, but not limiting the generality thereof, he would have the following minimum specific duties and responsibilities:

(a) initiation and extension of ongoing trial work to establish the most economic feeding regimen for dairy production, specifically determining:

(i) the feed values of various forages harvested at different stages of growth and stored as silage or hay;

(ii) the production response to different levels of concentrate feeding in combination with different types and quality of forage;

(iii) the response to concentrates when cattle are grazed or fed green pasture or forage crops.

(b) Comparing different feeding systems, including stall feeding, self-feeding or combinations thereof;

(c) developing comparative information on various winter feeding systems, particular emphasis being given to substitition of imported feedstuffs with locally produced goods;

(d) overseeing and encouraging the selection and employment of animal health staff, particularly veterinarians, to provide an effective animal health, AI and milk quality control service to farmers;

(e) improving the analytical laboratory services available to farmers and veterinarians;

(f) arranging bulk purchase of drugs for sale to farmers;

(g) assist training of KDBC field staff and farmers in matters relating to animal health and nutrition. This may involve updating existing training manuals and the extension material provided to farmers.

(h) On completion of his appointment provide MAF, KDBC and IBRD with a brief report of the outcome of his work and recommendations for future action.

3. Pasture Management Specialist - would be attached to and administratively responsible to the Department of Technical Services, KDBC. Including, but not limiting the generality thereof, he would have the following minimum specific duties and responsibilities:

(a) assessing the existing state of knowledge on pasture and forage production in Korea, and on the basis of that knowledge assist KDBC to implement the pasture development, maintenance and renewal phases of the project sub-components;

(b) initiate and continue worthwhile on-going research projects commenced under Project I, to determine the most suitable grasses, forage and legume plants for dairy development in Korea. Particular emphasis should be given to the most attractive economic methods of pasture or crop establishment, seeding and fertilizing and management. The appointee would be expected to coordinate his work with that of the animal nutrition specialist and with research teams working on similar problems in Korea;

(c) formulating and supervising a scheme for pasture and forage seed multiplication with project farmers, or other farmers, using imported foundation seed;

(d) assisting the training of Project farmers and field technicians in improved methods of pasture and forage crop production, hay and silage making, which may require updating of existing training materials and the extension material provided to farmers.

(e) on completion of his appointment, provide MAF, KDBC and IBRD with a brief record of his work and make recommendations for future action.

4. Dairy Processing Specialist - would be attached to and administratively responsible to the the Dairy Processing Department, KDBC. Including, but not limiting the generality thereof, he would have the following minimum specific duties and responsibilities:

(a) advising the administrative officials (President and Director, Department of Dairy Processing) on major policy decisions in respect to the dairy products processing facilities sub-project.

(b) advising KDBC on the most appropriate way to implement the processing sub-project. In particular, the siting of facilities, the preparation of the design, layout and specifications of structures and equipment; preparation of international and national tenders for materials, equipment, utilities and labor, evaluation of tenders and recommendations of contracts;

(c) supervising the construction and installation of buildings, equipment, and utilities;

(d) guiding management, and training personnel to operate the existing and new facilities. This may involve the preparation of an operational manual detailing specific duties and the manner in which they are to be performed.

(e) working with the Technical Director and the Animal Health Specialist to maintain a milk quality control service.

(f) working with the Technical Director to coordinate milk flows from near and existing farms with contribution and operation of new and existing milk processing facilities.

(g) providing Government and IBRD with regular critical reports on the progress of the milk products processing sub-components of the project identifying problem areas present and future and recommending courses of action.

(h) on completion of his appointment, provide MAF, KDBC and IBRD with a brief record of his work and make recommendations for future action.

KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Economic Analysis

A. Introduction

1. The major objectives of the project are (i) to raise the income base of part of the Korean rural population, (ii) to create additional rural and urban job opportunities, and (iii) to increase the domestic supply of milk and milk products to meet domestic demand.

2. Items (i) and (ii) have been dealt with in Annex 4. The project as a whole is justified only if these desirable policy objectives also show an acceptable EROR and if the financial returns to farmers (Annex 4) and to KDBC (Annex 5) are also acceptable. The evaluation of the economic merit of the Project is presented below.

B. Summary of Economic Evaluation

3. The economic rate of return is estimated at 15%. Sensitivity analysis shows that the EROR rises to 25%, if the benefits rise by 10%; and falls to 4% if the costs increase by 10% over the best estimates used.

4. The calculations shown in Table 2 indicate that the balance of payments of Korea would not be adversely affected by the implementation of the Project; foreign exchange savings of some $27 million are expected for the life of the Project.

5. The Project is justified on the basis of the acceptable EROR of 15% shown above. (Table 1)

C. Methodology

6. The economic rate of return was obtained after the adjustment of the main benefits and costs to their border prices or the border prices of their tradeable components by the elimination of taxes and subsidies. Alternative values applied to the domestic price structure in the analysis are detailed below.

Raw Milk

7. The alternative milk supply for Korea is the importation of milk fat and skim milk powder, which would be used to reconstitute liquid milk. One metric ton of reconstituted milk requires:

	US$	Thousand won
83 kg. skim milk powder	83.83	40.24
32 kg. anhydrous milk fat	55.68	26.73
Minor ingredients	10.00	4.80
Total cost	149.51	71.77

8. The costs of reconstituting milk are actually less than the cost of collecting milk from farmers, but for the purposes of the analysis it was assumed that they are identical. The rest of the processing and packing costs are identical for both products. The local price of 1 mt of Korean milk is 120,000 won. The reconstituted product costs 60% of the price of locally produced milk. Raw milk was thus valued at 60% of the price used in the financial analysis. No premium was attached to the value for preference of Korean consumers to a fresh milk alternative as there is no distinction between the alternative and milk in the processed end products produced by KDBC.

Baby Milk Powder

9. An infant powdered milk, imported in bulk, costs US$1,475 per mt C.I.F. Busan. Adjusting the border price for Korean packing in 500 g. cans similar to the one KDBC produces, the cost of baby powder milk would be 986,000 won per mt (US$2,054). This price, 73% of the KDBC product price, was used in the economic analysis.

Whole and Skim Milk Powders

10. Whole milk powder was devalued to the border level, if Korean packed. As the C.I.F. Busan price is 554,880 won per mt, whole milk powder as an input to the Yeongnam plant was valued at 36.9% of the local price. Skim milk powder has been valued at 484,800 won per mt or 34.6% of the locally produced product.

Tetrapack Sterilized Milk

11. Tetrapacked milk is not an externally traded good; its economic value was adjusted by the border price of its tradeable components, raw milk and asceptic packing paper. Price of tetrapack milk was thus adjusted to keep the same proportion of raw milk and paper in the total value of sales as in the financial analysis, that is about 63%.

Frozen Milk Products

12. Frozen milk products are not externally tradeable goods and were adjusted by bringing the tradeable components in the final product, raw milk, whole milk powder, and imported materials, to their border level and keeping their share in the total sales of ice cream, about 40%.

Powdered Coffee Creamer

13. Powdered coffee creamer of the dairy variety which would be produced at the Central plant, was valued at 1,227 won per kg. by keeping the same proportion of raw milk in total sales. The methodology used was the same as that applied to tetrapacked milk and ice cream products.

Fertilizers

14. Fertilizers were adjusted to their average expected border prices in the period 1975-80, based on forecast prices by IBRD Commodity Division and in consultation with the USDA Commodities Statistics Department. It was estimated that the present high prices in the international market would decline by the end of the decade, and should therefore be reduced for economic analysis.

	Expected Average C.I.F. Prices: 1975-80(US$)	Local Price 1975(US$)	Adjustment %
Urea	179	133.3	34
Muriate of Potash	79	54.2	46
Normal 22% Phosphate	69	47.9	44

15. The value of fertilizers for economic analysis was then determined on the basis of the share of each of the above elements in the total cost of fertilizers to the farm:

	% Share in Total Cost		
Urea:	33	--	0.33 x 34 = 11.2
Muriate of Potash:	23	--	0.23 x 46 = 10.6
Normal 22% Phosphate:	44	--	0.44 x 44 = 19.4
Total	100%		41.2% (Approximately 40%)

16. The price of fertilizers was raised by 40%. The fertilizer price for economic analysis affected items labelled as pasture establishment, crop establishment, pasture maintenance and pasture renovation in Annex 4, Tables 1 and 3. Each cost was raised as follows:

	Share of Fertilizer in Cost %	Adjustment %
Pasture Maintenance	100	+ 40
Crop production: corn	74	+ 30
ryecorn	79	+ 32
barley	60	+ 24
Pasture renovation	32	+ 13
Investments:		
pasture establishment	23	+ 9
crop establishment	14	+ 6

Concentrate Feed

17. The controlled price of concentrate feed in the financial analysis is US$0.133/kg. According to recent feed production statistics, corn, soybean meal, and fish meal, account for 70% of the total quantity of feed produced for sale in Korea. A similar procedure to the one applied for fertilizers was followed. Average C.I.F. prices of the feed ingredients for the period 1975-80 were used as the basis for adjustment.

	% in Total Production of Feed	Average C.I.F. Price 1975-80	Cost for 0.7 mt Feed
Corn	60%	US$114/mt	0.60 x 114 = 68.4
Soyabean meal	6%	US$173/mt	0.06 x 173 = 10.4
Fishmeal	4%	US$288/mt	0.04 x 288 = 11.5
	70%		US$ 90.3

Assuming the share of 70% of these ingredients in total feed is constant, the C.I.F. price of feed used in projection is as follows:

$$\frac{90.3 \times 100}{70} = \text{US\$129/mt of feed}$$

18. The Government presently subsidizes the price of feed concentrates from the current C.I.F. prices for corn, soyabean meal, and fishmeal. By averaging C.I.F. prices to 1980, the domestic price of US$133.33/mt for concentrates is slightly higher than US$129.00 price used in projections. The economic analysis thus reduced the price by 3.3% to reflect its cost to the economy.

Foreign Subsidiary Materials

19. The cost of foreign subsidiary materials used as inputs for the production of frozen milk products, baby milk powder, tetrapacked milk, and coffee creamer, was reduced by 15% to eliminate duties.

Investment Costs

20. Investment costs of the motorized plant for the farm were reduced by the amount equivalent to duties on their imported components:

Item	Foreign Component	Duty	% Adjustment
Water pump	50%	20%	- 10%
Cutter	50%	20%	- 10%

21. Similarly, investment costs of the processing plants were reduced to eliminate duties:

Item	Foreign Component	Duty	% Adjustment
Equipment & Machinery	43%	10%	- 4%
Accumulation depot & collection centers	47%	10%	- 5%

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SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Economic Rates of Return
(Won'000,000)

	Years												
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Dairy Farms													
Sales 1/ 2/	-	80	331	936	1374	1575	1800	1986	2124	2247	2349	2373	2373
Incremental Value of Herd	-	-	-	-	-	-	-	-	-	-	-	-	2067
Residual Plant Value	-	-	-	-	-	-	-	-	-	-	-	-	282
Operating Expenses 3/	-	(134)	(426)	(769)	(1053)	(1177)	(1265)	(1328)	(1378)	(1417)	(1432)	(1435)	(1435)
Investment Costs 3/ 4/	-	(1514)	(1406)	(1424)	(108)	-	-	-	-	-	-	-	-
Dairy Processing Facilities													
Yeongnam Plant													
Sales (Frozen Milk Products) 2/	-	-	1089	2309	3628	3958	4397	4782	5112	5277	5497	5497	5497
Processing Expenses:													
Raw Milk 2/	-	-	(144)	(302)	(475)	(518)	(576)	(624)	(670)	(691)	(720)	(720)	(720)
Operating Costs/Other Inputs	-	-	(720)	(1382)	(2101)	(2306)	(2543)	(2762)	(2942)	(3030)	(3145)	(3145)	(3145)
Overhead	-	(111)	(361)	(501)	(549)	(565)	(580)	(595)	(606)	(613)	(620)	(620)	(620)
Investment Costs	(130)	(1199)	(205)	(303)	(159)	-	(9)	(29)	(18)	(9)	-	(9)	(29)
Central Plant													
Sales (Baby Food, Skim Milk Powder & Powdered Creamer) 2/	-	-	390	864	1648	1871	2205	2421	2544	2718	2728	2750	2750
Processing Expenses:													
Raw Milk 2/	-	-	(72)	(160)	(304)	(345)	(407)	(447)	(469)	(502)	(504)	(508)	(508)
Operating Costs/Other Inputs	-	-	(280)	(557)	(988)	(1124)	(1306)	(1443)	(1514)	(1612)	(1617)	(1631)	(1631)
Overhead	-	-	(21)	(48)	(76)	(86)	(102)	(112)	(117)	(126)	(126)	(127)	(127)
Investment Costs	(140)	(348)	(95)	-	-	-	-	-	-	-	-	-	-
Honam Plant													
Sales (Tetrapack milk) 2/	-	-	337	543	654	795	816	875	914	919	926	928	966
Processing Expenses:													
Raw Milk 2/	-	-	(149)	(235)	(283)	(344)	(353)	(379)	(396)	(398)	(401)	(402)	(402)
Operating Costs/Other Inputs	-	-	(141)	(196)	(237)	(276)	(282)	(315)	(326)	(327)	(339)	(340)	(340)
Overhead	-	-	(53)	(65)	(80)	(90)	(91)	(109)	(112)	(112)	(121)	(121)	(121)
Investment Costs	-	(65)	(141)	-	-	-	-	-	-	-	-	-	-
All Processing Plants:													
Residual Value	-	-	-	-	-	-	-	-	-	-	-	-	655
Management and Technical Services	-	(105)	(149)	(141)	(106)	(77)	(46)	-	-	-	-	-	-
Balance	(270)	(3396)	(2216)	(1431)	785	1291	1658	1921	2146	2324	2475	2490	5512

Note: Figures in brackets are costs

Economic Rate of Return of the Project: 15%

ANNEX 7
Table 1

1/ Milk sales are an income to the farmers and an operating expense to the processing facilities that cancel each other out in the calculation of the annual balance.
2/ Milk and dairy products valued at their C.I.F. prices or at the C.I.F. prices of their components plus other manufacturing costs.
3/ Subsidies are included as part of the costs.
4/ Eighty percent of existing farms start investment in 1976 and 20% in 1977; 25% of new farms start investments in 1976; 35% in 1977; and 40% in 1978.

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SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Foreign Exchange - Savings Summary
(US$)

	Project Years												
	1	2	3	4	5	6	7	8	9	10	11	12	13
SAVINGS	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Yeongnam	-	-	997,801	2,099,272	3,297,835	3,598,020	3,997,458	4,347,510	4,647,445	4,796,583	4,997,343	4,997,343	4,997,343
Honam - Tetrapack Milk	-	-	306,250	485,417	583,333	710,417	729,166	781,250	816,666	820,833	827,083	829,166	892,166
Central Babyfood and Coffee Creamer	-	-	810,416	1,800,000	3,433,333	3,897,916	4,593,750	5,043,750	5,300,000	5,662,500	5,683,333	5,729,166	5,729,166
Total Savings			2,114,467	4,384,689	7,314,501	8,206,353	9,320,374	10,172,510	10,764,111	11,279,916	11,507,759	11,555,675	11,555,675
DISSAVINGS													
Farms	-	1,992,533	1,844,808	2,020,120	679,842	740,701	808,466	861,662	877,072	877,072	877,072	877,072	877,072
Plants	170,045	1,936,179	2,111,714	2,923,745	3,955,754	3,794,183	4,322,085	4,912,110	5,213,977	5,407,606	5,559,016	5,571,716	5,571,716
Technical Services	-	196,875	279,375	264,375	198,750	144,375	86,250	-	-	-	-	-	-
Total Dissavings	170,045	4,125,587	4,235,897	5,208,240	4,834,346	4,679,259	5,216,801	4,912,110	6,091,049	6,284,678	6,436,088	6,448,788	6,448,788
NET SAVINGS	-170,045	-4,125,587	-2,121,430	-823,551	2,480,155	3,527,094	4,103,573	5,260,400	4,673,062	4,995,238	5,071,671	5,106,887	5,106,887

TOTAL IN PROJECT LIFE: US$ 27,077,105

TOTAL IN PROJECT LIFE IF DISCOUNTED BY 9%: US$ 12,449,256

ANNEX 7
Table 2

KOREA

SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Project Finance and Estimated Disbursements

A. Project Costs and Project Financing

Project Costs

1. Project costs, as summarized in para 3.23 of the Main Report, are elaborated in Table 1 of this annex.

2. Total farm development costs were obtained from the models of investment costs per new farm and the costs of restructuring an existing farm (Annex 4, Tables 1 and 5). The cost per new farm would be 7.8 million won (US$16,400) and for existing farms 2.2 million won (US$4,600), excluding price and physical contingencies and farm working capital.

3. Base investment cost for dairy processing facilities, including start-up materials, total 3.1 billion won (US$6.5 million). The detailed estimates of these costs are included in Annex 5, Table 1.

Contingencies

4. Price and physical contingencies have been assumed for both local and foreign costs.

(a) Physical. Total project cost includes physical contingencies of 10% on all categories except management and technical services and working capital.

(b) Price. The annual percentage rates of increase for the costs of equipment and civil works which were used are as follows:

	Equipment	Civil Works
1975	20	18
1976	10	14
1977-79	8	12

These estimates are based on experience in Korea on price movements for imported equipment and for civil works. The total of the price contingencies, excluding farm working capital and dairy processing start-up materials, applied over the project period, averages 36%.

Foreign Exchange Risk

5. The Government has agreed to assume the foreign exchange risk for IBRD funds used for farm development and technical services. Under Project I, KDBC carried the foreign exchange risk for both farm development and dairy processing funds. Devaluations of the won and reduction of the par value of the dollar have resulted in additional long term liabilities to KDBC of about US$2.0 million. In projecting a foreign exchange risk at an increase of 3% per annum on IBRD funds for Project II, total payments for foreign exchange alignment to 1987 would amount to US$5.4 million. Government would bear about US$2.6 million of the total while KDBC would incur US$2.8 million for the risk on IBRD funds for dairy processing.

Project Finance

6. KDBC would borrow IBRD funds and Government funds to be used for on-lending to farmers and for milk processing, on the following terms:

	Interest %	Terms of Loan years	Grace Period
IBRD funds to Government	8.5	25	7
Government on-lending IBRD funds to KDBC	8.5	15	6
NACF funds to KDBC	9.0	9	4
KDBC on-lending to Farmers -			
a) Buildings, Plant and Livestock	12.0	9	3
b) Pasture Establishment	9.0	9	3

7. Government has agreed to no spread on interest rates for on-lending IBRD funds (US$15.0 million) to KDBC, but would receive additional liquidity of 10 years in repayment to IBRD from KDBC. NACF would lend US$3.1 million to KDBC at 9% for farm development. The Government subsidy (US$0.8 million) would be granted to farmers for pasture establishment through the MAF. Government would bear the cost of the commitment fee on undisbursed IBRD funds.

8. KDBC would on-lend IBRD funds to farmers at 12%. NACF funds for farm buildings, plant and livestock would be on-lent to farmers at 12%. The NACF loan for pasture establishment would be on-lent by KDBC to farmers at 9%. In conformance with present NACF lending to farmers, all farm loans would be made for a total of 9 years with 3 years grace. Projected cash flows for KDBC and farmers indicate that there would be no difficulty meeting debt service requirements with the proposed terms of financing. KDBC would have the blended spread of about 3.35% on loans to farmers from NACF and IBRD funds. This spread is adequate for KDBC recovery of costs incurred for administration and other overheads associated with on farm lending and management and technical services.

B. Phasing and Disbursements

Phasing of Farm Development

9. On farm investments would not begin until year 2 of the Project when construction of the Yeongnam plant and the expansion of existing facilities would be sufficiently advanced to receive the milk flow from these farms. As most of the existing farms with 8 cows or less require immediate assistance, 80% of these farms would be financed as early as possible, in the first year of farm development (Project year 2); the remaining 20% would start on-farm investments in Project year 3. New farm development would be phased over 3 years. The flow of funds for disbursement by sources for the phasing of farm development is contained in Table 2 of this annex. Phasing of farm development is detailed in the following:

	-----Project Year-----				
	1	2	3	4	
	1975	1976	1977	1978	Total
No. of new farms	--	113	157	180	450
No. of existing farms	--	319	81	---	400

Phasing of Processing Plants

10. Processing plant investments would be phased over five years with the majority of investments made in Project year 2. Details of phasing of these plant investments in Annex 5, Table 1, and the ssummary of disbursements by source as contained in Table 2 of this annex.

11. The Yeongnam plant should be built as soon as possible to take advantage of the large and open market in the Yeongnam-Busan area, and to improve the profitability of KDBC. Investments in land, civil works and several buildings would be made in November-December 1975, and processing, packing and refrigeration equipment purchased the following year. During its first year of operation, it is anticipated that whole milk powder will need to be transported to Yeongnam from the Central plant until the milk flow from the Yeongnam farms is sufficient to meet processing requirements.

12. With the exception of equipment for powdered coffee creamer in year 1, investments for the Central plant expansion would be made in year 2 of the Project. The capacity of the evaporator unit would need to be enlarged before milk intake rises beyond 35 mt per day. Capacity is presently limited to 2.2 mt per hour for baby milk powder or 4.4 mt per hour when producing whole milk powder. To facilitate additional milk intake under Project II, to allow for maximum production of baby milk powders, and to provide concentrated milk solids for the Yeongnam plant, the project would finance the purchase of a batch evaporator with a 10,000 liter capacity in year 3 of the project.

13. The heat exchange for sterilizing milk at Honam plant would be installed in year 3 when sterilizing capacity would be short of packing capacity. The exchanger would allow for continuous plant operation without delays in the cleaning cycle of the sterilizer.

Disbursements

14. It is expected that the IBRD loan (US$15.0 million) would be disbursed over a 7 year period. Phasing of disbursements by Project costs is shown in Table 2 and quarterly disbursements in Table 3. 18% of IBRD funds including contingencies would be disbursed in FY1976; 43% in FY1977; 17% in FY1978; and the remaining 22% in later years.

15. The budgeted allocation of the NACF loan (US$3.1 million) is shown in Table 2. Disbursement of the NACF loan including contingencies would be 451 million won in calendar year 1976; 407 million won in 1977; 432 million won in 1978; and 210 million won in 1979. Funds in the NACF loan for contingencies on all local costs of dairy development would be available to farmers in loans from KDBC. The phasing of disbursement of farm subsidies by Government (US$0.8 million) is expected to be 101 million won in 1976; 102 million won in 1977, 108 million won in 1978, and 51 million in 1979.

16. The increased capitalization of KDBC to implement the project would be 1,427 million won (US$3.0 million). Paid in shares for local currency costs of dairy processing and management and technical services would be 120 million won by January 30, 1976; 450 million won by November 30, 1976; 200 million won by April 30, 1977; 300 million won by February 28, 1978 and 357 million won by January 30, 1979. Should there be any shortfall in share-capital meeting local currency needs is the initial years of the project KDBC would borrow short-term capital. It is anticipated that KDBC share capital requirements after 1977 would be reviewed in that year to take into consideration the magnitude of the Company's cash surplus. Capital increases would be provided by individual shareholders in KDBC, AFDC and participating farmers. AFDC, as in Project I would participate with 40% to 49% ownership. KDBC and associated farmers are expected to have 51 to 60% ownership. Assurances have been received from the Government that if the full amount of share capital increase is not raised in the form of equity, bridging loans to the extent required would be made by NACF or other appropriate Government agencies. These would be repaid when KDBC is able to raise sufficient resources through increases in equity. To ensure that private investors would be widely diffused, KDBC would not, except with the consent of IBRD, accept new shareholders who own or control more than 5% of KDBC's subscribed capital at any particular time.

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SECOND KOREA DAIRY DEVELOPMENT PROJECT

Sources of Funding

U.S. Dollars (Million Won in Parenthesis)

	Total Cost			IBRD	Government		KDBC	Farmers	
	New Farm	Existing Farm	Total	Foreign Exchange	MAF Subsidy	NACF Loan to KDBC	Share Capital	New Farm	Existing Farm
1. DAIRY DEVELOPMENT									
Pasture Establishment	1,060,290 (509)	289,800 (139)	1,350,090 (648)	- -	755,877 (362)	236,686 (114)	- -	280,659 (135)	76,868 (37)
Crops	341,618 (164)	101,220 (49)	442,838 (213)	49,140 (24)	- -	- -	- -	303,541 (146)	90,157 (43)
Buildings, Plant, Water	2,258,550 (1,084)	78,540 (38)	2,337,090 (1,122)	358,523 (172)	- -	714,034 (343)	- -	1,221,538 (586)	42,995 (21)
Livestock	3,735,900 (1,793)	1,245,300 (598)	4,981,200 (2,391)	4,483,290 (2,152)	- -	- -	- -	373,432 (179)	124,478 (60)
Pasture Renovation	-	139,860 (67)	139,860 (67)	42,000 (20)	- -	- -	- -	- -	97,860 (47)
Sub-total	7,396,358 (3,550)	1,854,720 (891)	9,251,078 (4,441)	4,932,953 (2,368)	755,877 (362)	950,720 (457)	- -	2,179,170 (1,046)	432,358 (208)
Contingency	3,323,098 (1,595)	833,300 (400)	4,156,398 (1,995)	2,083,697 (1,000)	- -	2,072,701 (995)	- -	- -	- -
Working Capital - Farms	500,000 (240)	- -	500,000 (240)	400,000 (192)	- -	100,000 (48)	- -	- -	- -
Total	11,219,456 (5,385)	2,688,020 (1,291)	13,907,476 (6,676)	7,416,650 (3,560)	755,877 (362)	3,123,421 (1,500)	- -	2,179,170 (1,046)	432,358 (208)
2. DAIRY PROCESSING PLANTS	-	-	6,464,600 (3,103)	4,433,350 (2,128)	-	-	2,031,250 (975)	-	-
Contingency	-	-	2,300,000 (1,104)	1,630,000 (782)	-	-	670,000 (322)	-	-
Sub-total			7,100,000 (3,408)	5,030,000 (2,414)			2,701,250 (1,297)		
3. MANAGEMENT AND TECHNICAL SERVICE COST			1,300,000 (624)	1,100,000 (528)			200,000 (96)		
Contingency			490,000 (237)	420,000 (202)			70,000 (35)		
Sub-total			1,790,000 (861)	1,520,000 (730)			270,000 (131)		
Total			24,462,076 (11,744)	15,000,000 (7,200)	755,877 (362)	3,123,421 (1,500)	2,971,250 (1,428)	2,179,170 (1,046)	432,358 (208)
GRAND TOTAL			24,462,076 (11,744)	15,000,000 (7,200)	3,879,298 (1,862)		2,971,250 (1,428)	2,611,528 (1,254)	
PERCENTAGE OF TOTAL PROJECT COST				61%	16%		12%	11%	

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SECOND INTEGRATED DAIRY DEVELOPMENT PROJECT

Table 2: Project Costs by Sources for Disbursement
(Million Won)

CATEGORY	1 1975	2 1976	3 1977	4 1978	5 1979	6 1980	7 1981	TOTAL
Dairy Development								
IBRD Loan /1		1,023	661	634	242			2,560
Contingencies /2		350	280	267	103			1,000
Government Loan /3		175	128	136	66			505
Contingencies /4		276	279	296	144			995
Government Subsidy		101	102	108	51			362
Total Farmer's Contribution		439	350	336	129			1,254
Sub-Total		2,364	1,800	1,777	735			6,676
Dairy Processing Facilities								
IBRD Loan /5 /6	156	1,270	288	262	152			2,128
Contingencies	50	558	94	68	12			782
KDBC Financed /7	200	744	222	77	54			1,297
Sub-Total	406	2,572	604	407	218			4,207
Management and Technical Services								
IBRD Loan		89	127	120	90	64	38	528
Contingency /8		34	48	46	35	24	15	202
KDBC Financed /7		22	30	28	23	17	11	131
Sub-Total		145	205	194	148	105	64	861
TOTAL PROJECT DISBURSEMENT	406	5,081	2,609	2,378	1,101	105	64	11,744
of which:								
a) IBRD Loan	156	2,382	1,076	1,016	484	64	38	5,216
Contingencies	50	942	422	381	150	24	15	1,984
Total IBRD Loan	206	3,324	1,498	1,397	634	88	53	7,200
b) Government Loan	-	175	128	136	66	-	-	505
Contingencies	-	276	279	296	144	-	-	995
Total Government Loan	-	451	407	432	210	-	-	1,500
Goverment Subsidy	-	101	102	108	51	-	-	362
Total Government Contribution	-	552	509	540	261	-	-	1,862
c) Total KDBC Finance /9	200	766	252	105	77	17	11	1,428
d) Total Farmers Contributions	-	439	350	336	129	-	-	1,254

/1 IBRD loan includes 192 million won in 1976 for incremental farm working capital on which there are no price or physical contingencies.
/2 Contingencies in Dairy Development have been reduced by 137 million won, US$ 284,000,to reduce total IBRD loan to US$ 15.0 million.
/3 Government loan includes 48 million won in 1976 for local costs of incremental farm working capital on which there are no price or physical contingencies.
/4 Government would finance all contingencies for local costs for dairy development.
/5 IBRD loan includes start-up materials for dairy processing, about 496 million won, on which there are no contingencies.
/6 All 1975 disbursements represent contracts made in calender year 1975. Actual disbursements are likely to occur in 1976.
/7 KDBC finance represents expected need for local currency including contingencies.
/8 Price contingency only.
/9 To be financed from increases to share capital, from cash flow surpluses,and short term loans.

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SECOND KOREA DAIRY DEVELOPMENT PROJECT

Table 3: Estimated Quarterly Schedule of Disbursement
(US$ '000)

IBRD Fiscal Year and Quarter	Quarterly Disbursement	Cumulative at End of Quarter
FY 1976		
January - March 1976 /1	1,258	1,258
March - June 1976	1,463	2,721
FY 1977		
1st July - September 1976	2,199	4,920
2nd October - December 1976	2,434	7,354
3rd	1,269	8,623
4th	619	9,242
FY 1978		
1st	617	9,859
2nd	617	10,476
3rd	585	11,061
4th	730	11,791
FY 1979		
1st	797	12,588
2nd	798	13,386
3rd	294	13,680
4th	343	14,023
FY 1980		
1st	342	14,365
2nd	342	14,707
3rd	46	14,753
4th	46	14,799
FY 1981		
1st	46	14,845
2nd	45	14,890
3rd	28	14,918
4th	28	14,946
FY 1982		
1st	27	14,973
2nd	27	15,000

/1 Subject to loan effectiveness January 30, 1976.

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